FIX ORNERY SIDE GLASS
WE SHOW YOU HOW!

HOW TO TIG WELD ALUMINUM!
MILLER MAKES IT EASY!

BUILD A BUCKS-DOWN LA-BASED STROKER!
GET 416 CUBES FROM YOUR 340 SMALL-BLOCK!

MOPAR MUSCLE

REBORN!
2 FAST 2 FURIOUS
'70 CHALLENGER

GAME CHANGER!

HOW THIS HEMI DART & ITS OWNER TRANSFORMED THE MOPAR WORLD

THE TWISTS & TURNS BEHIND ONE OF THE INDUSTRY'S BIGGEST SUCCESS STORIES!

QFT'S SELF-LEARNING QFI INJECTION
COOL CARB LOOKS
EFI MANNERS
SIMPLE BOLT-ON

MOPAR INTERIORS GO HIGH-CLASS
ROAD-HUGGING SEATS FROM TMI!

BIG-BLOCK A-BODY EXHAUST TECH
TTI LONG-TUBE HEADERS & X-PIPE!

SPECIAL REPORT:

INSIDE SRT'S HELLCAT HEMI!
ALL-NEW SHORT-BLOCK
• CYLINDER HEADS • BLOWER
• INTERCOOLER • LUBE SYSTEM
EXCLUSIVE DETAILS & PHOTOS NO ONE ELSE HAS!

Great Gearhead Gift Ideas

Decorate Your Favorite Muscle Car with YEARONE Parts at Great Savings! Save 20% or more on select products during this holiday season.

For details call us at 1-800-932-7663 or shop Online at YEARONE.com. Use special code **HSM14** to take **20% off** the current retail price of all non-discount exempt items in our catalog. Orders over $500 will also qualify for volume discounts saving you up to 28% on applicable items. Sale does not include discount exempt items and cannot be used with any other offers. Some parts pictured are discount exempt.

Sale Ends December 31, 2014

Chrysler Catalog
Print:
Mopar A/B/E-Body (1966-74)
(ALSO AVAILABLE ONLINE)

Web:
YEARONE Wheels
Automobilia

Restoration & Performance Parts for GM, Ford & Chrysler Muscle Cars

HOT RODDERS CHILDREN'S CHARITY
Because We Care!

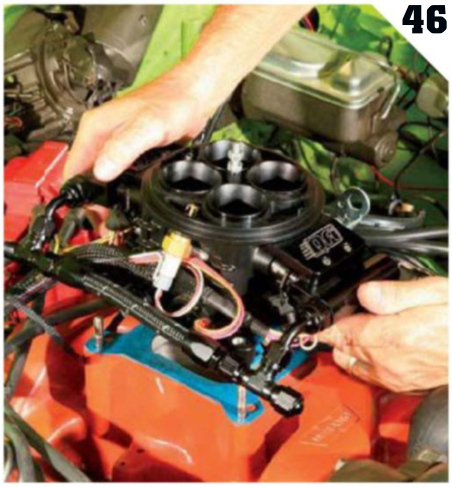
YEARONE.com

1-800-932-7663

MM015

VOLUME 28 ✪ NUMBER 2 ✪ FEBRUARY 2015

CONTENTS



ON THE COVER
Bill Reilly of Reilly Motorsports has built a Mopar suspension empire with his line of AlterKtion and Street-Lynx suspension kits, but it was an ill-handling '69 Dodge Dart that provided the inspiration (and perspiration!) for years of trial-and-error–style research and development. Reilly practices what he preaches, and every nut and bolt of an RMS kit has been given the royal beat-down on this nasty Hemi-powered A-Body! Story on p. 62. Photo by John Machaquiero

MOPAR MUSCLE.COM

TECH

PROJECT CAR

FEATURES

DEPARTMENTS

HARBOR FREIGHT
QUALITY TOOLS AT RIDICULOUSLY LOW PRICES

How Does Harbor Freight Sell GREAT QUALITY Tools at the LOWEST Prices?

We have invested millions of dollars in our own state-of-the-art quality test labs and millions more in our factories, so our tools will go toe-to-toe with the top professional brands. And we can sell them for a fraction of the price because we cut out the middle man and pass the savings on to you. It's just that simple! Come visit one of our 500+ Stores Nationwide.

SUPER COUPON

20% OFF

ANY SINGLE ITEM

LIMIT 1 - Save 20% on any one item purchased at our stores or HarborFreight.com or by calling 800-423-2567. *Cannot be used with other discount, coupon, gift cards, Inside Track Club membership, extended service plans or on any of the following: compressors, generators, tool storage or carts, welders, floor jacks, Towable Ride-On Trencher, Saw Mill (Item 61712/62366/67138), Predator Gas Power Items, open box items, in-store event or parking lot sale items. Not valid on prior purchases after 30 days from original purchase date with original receipt. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

56203395

SUPER COUPON

FREE WITH ANY PURCHASE

PITTSBURGH 1" x 25 FT. TAPE MEASURE

ITEM 69080 69030/69031

Item 69080 shown

$6.99 VALUE

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

56192885

SUPER COUPON!

★WINNER★ Truckin' Magazine

US★GENERAL 26", 4 DRAWER TOOL CART

• 580 lb. Capacity

$99.99

Item 95659 shown

SAVE $180

$159.99 REG. PRICE $279.99

LOT NO. 95659 61634/61952

56257625

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

SAVE $80

PITTSBURGH RAPID PUMP® 3 TON ALUMINUM RACING JACK

LOT NO. 68052/61386 62248

• 3-1/2 Pumps Lifts Most Vehicles
• Weighs 56 lbs.

$169.99

Item 68052 shown

REG. PRICE $249.99

56185199

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

CHICAGO ELECTRIC WELDING

90 AMP FLUX WIRE WELDER

• No Gas Required

LOT NO. 68887 61849

WE CARRY A FULL LINE OF WELDING WIRE

SAVE $50

$99.99

Item 68887 shown

REG. PRICE $149.99

56190609

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

AIR ANGLE DIE GRINDER

LOT NO. 32046/69945/62439

Item 32046 shown

CENTRAL PNEUMATIC

SAVE 50%

$9.99 REG. PRICE $19.99

56219585

LIMIT 9 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

1000 LB. CAPACITY ENGINE STAND

CENTRAL MACHINERY

SAVE 28%

Item 32916 shown

LOT NO. 32916 69886/69520

$49.99

REG. PRICE $69.99

56205352

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

"The Perfect Compressor with Powerful, Quiet and Consistent Airflow... Plus we Love the Low Price"
– Street Trucks Magazine

2.5 HP, 21 GALLON 125 PSI VERTICAL AIR COMPRESSOR

SAVE $70

CENTRALPNEUMATIC

$149.99

Item 67847 shown

LOT NO. 67847 61454/61693

REG. PRICE $219.99

56254901

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

PITTSBURGH 6 TON HEAVY DUTY STEEL JACK STANDS

SAVE 50%

LOT NO. 38847/62393 69596/61197

Item 38847 shown

$39.99

REG. PRICE $79.99

56183913

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

★WINNER★ Best Value Award The Family Handyman

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

NEW

CHICAGO ELECTRIC POWER TOOLS

SAVE $160

Item 69684 shown

LOT NO. 69684/61776 61969/61970

$139.99

$199.99 REG. PRICE $299.99

56186654

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

HaulMaster

72" x 80" MOVER'S BLANKET

LOT NO. 66537 69505/62418

Item 66537 shown

$5.99

SAVE 66%

REG. PRICE $17.99

56197767

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

6" DIGITAL CALIPER

PITTSBURGH

LOT NO. 47257/61585 61230/62387

Includes two 1.5V SR44 button cell batteries.

SAVE 66%

$9.99 REG. PRICE $29.99

Item 47257 shown

56237055

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

SAVE $200

Item 69729 shown

4000 PEAK/ 3200 RUNNING WATTS 6.5 HP (212 CC) GAS GENERATORS

• 70 dB Noise Level

SUPER QUIET

LOT NO. 69676/69729

LOT NO. 69675/69728 CALIFORNIA ONLY

$299.99 REG. PRICE $499.99

PREDATOR GENERATORS

56240089

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

2 PIECE VEHICLE WHEEL DOLLIES

HaulMaster

SAVE 50%

Item 67338 shown

LOT NO. 67338 60343

• 1500 Lb. Capacity

$39.99

$59.99

REG. PRICE $79.99

56245305

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

CENTRALPNEUMATIC

HIGH SPEED METAL SAW

LOT NO. 91753/60568

SAVE 61%

Item 91753 shown

$12.99

REG. PRICE $33.99

56296871

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

AUTO-DARKENING WELDING HELMET WITH BLUE FLAME DESIGN

CHICAGO ELECTRIC WELDING

LOT NO. 91214/61610

Item 91214 shown

SAVE 50%

$44.99

REG. PRICE $89.99

56261945

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

"Great Press for an Incredible Price!"
– American Iron Magazine

20 TON SHOP PRESS

CENTRAL MACHINERY

LOT NO. 32879 60603

SAVE $150

Item 60603 shown

• Pair of Arbor Plates Included

$149.99 ~~$199.99~~

REG. PRICE ~~$299.99~~

56307516

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

POWDER-FREE NITRILE GLOVES PACK OF 100

WESTERN SAFETY

• 5 mil. thickness

MEDIUM
LOT NO. 68496 61363/97581

LARGE
LOT NO. 68497/61360

X-LARGE
LOT NO. 68498/61359

YOUR CHOICE!

$6.49

REG. PRICE $11.99

Item 68498 shown

SAVE 45%

56296293

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

PITTSBURGH AUTOMOTIVE

2 TON FOLDABLE SHOP CRANE

LOT NO. 69514/60388

SAVE $120

Item 69514 shown

• Includes Ram, Hook and Chain

$179.99 ~~$229.99~~

REG. PRICE ~~$299.99~~

56260995

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

CEN-TECH.

AUTOMATIC BATTERY FLOAT CHARGER

Item 42292 shown

LOT NO. 42292 69594/69955

SAVE 70%

$5.99

REG. PRICE $19.99

56338560

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

40 PIECE 1/4" AND 3/8" DRIVE SOCKET SET

PITTSBURGH

LOT NO. 47902 61328

SAVE 60%

Item 47902 shown

$3.99

REG. PRICE $9.99

56338004

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

SAVE $120

"An Excellent Means of Adding a Winch to your 4x4 Without Breaking the Bank"
– 4 Wheel Drive & SUV Magazine

9000 LB. ELECTRIC WINCH WITH REMOTE CONTROL AND AUTOMATIC BRAKE

LOT NO. 68143/61346/61325/62278

Item 61325 shown

BADLAND

$279.99

REG. PRICE $399.99

56282209

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

NEW

120 LED RECHARGEABLE UNDER HOOD WORK LIGHT

luminar WORK

★ WINNER ★
Best Underhood Work Light
– Truckin' Magazine

LOT NO. 60793

SAVE 62%

$29.99

REG. PRICE $79.99

56324618

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

Haul Master

1195 LB. CAPACITY 4 FT. x 8 FT. HEAVY DUTY FOLDABLE UTILITY TRAILER

LOT NO. 90154/62170

SAVE $130

• DOT certified

Item 90154 shown

$269.99

REG. PRICE $399.99

56305703

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

3 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL STEP DRILLS

• Drill 28 Hole Sizes

WARRIOR

SAVE 60%

Item 91616 shown

LOT NO. 91616 69087/60379

$7.99

REG. PRICE $19.99

56332948

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

LOT NO. 69039 68217/60727/62286

10 FT. x 17 FT. PORTABLE GARAGE

Item 69039 shown

SAVE $120

$179.99 ~~$199.99~~

REG. PRICE ~~$299.99~~

56276560

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

drillmaster

Item 96289 shown

LOT NO. 96289/62340

SAVE 70%

$8.99

REG. PRICE $29.99

56323133

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

ENGLISH WHEEL KIT WITH STAND

LOT NO. 68385

CENTRAL MACHINERY

SAVE $70

$279.99

REG. PRICE $349.99

56304589

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINES

PREDATOR ENGINES

LOT NO. 60363/69730/68120

LOT NO. 69727 CALIFORNIA ONLY

Item 69727 shown

SAVE $150

$99.99

REG. PRICE $249.99

56329666

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

1500 LB. CAPACITY MOTORCYCLE LIFT

PITTSBURGH

LOT NO. 2792 69995/60536/61632

SAVE $70

$79.99 ~~$99.99~~

REG. PRICE ~~$149.99~~

Item 69995 shown

56266967

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

PITTSBURGH PRO

1/2" DRIVE 25" BREAKER BAR

SAVE 41%

LOT NO. 67933/60819

Item 67933 shown

$9.99

REG. PRICE $16.99

56314926

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

SUPER COUPON!

HEAVY DUTY RETRACTABLE AIR HOSE REEL WITH 3/8" x 25 FT. HOSE

LOT NO. 69234/46104/69266

Item 69234 shown

CENTRAL PNEUMATIC

SAVE 51%

$43.99

REG. PRICE $89.99

56338425

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 3/21/15. Limit one coupon per customer per day.

• 100% Satisfaction Guaranteed
• Over 25 Million Satisfied Customers
• No Hassle Return Policy
• Lifetime Warranty On All Hand Tools
• 500+ Stores Nationwide
• HarborFreight.com 800-423-2567

WHO LOVES YOU, BABY?

In putting together our deep-dive story on the Hellcat engine (see "Inside Hellcat," p. 10), I had an epiphany about guys in our age group: most of the time, the engine of our economy doesn't give a hoot about the engine that drives us. Before I explain myself: A recent survey of *Mopar Muscle* readers revealed that 96.6 percent of you are male, and 85 percent of readers are at least 45 years old. For our sake here, and to apologize in advance, that's the group I mean when I say *us*, *you*, or *our*. Now I'm gonna stir the pot, and if you're not angry (as well as being a whole lot more appreciative of Chrysler) when I'm finished, then I've done it wrong!

Ask any expert on marketing at any PR firm, and they will tell you the most important demographic in advertising is the 18-24 crowd, with the female half of that getting most of the cash grab. I don't know why this is; I'm just the messenger. Turn on the TV and check it out if you don't believe me. Ad agencies appeal to women so heavily that a style of ad copy called "male bashing" has become the standard. It came into fashion in the '70s, and it's the usual shtick where the advertiser shows some dumb guy being shown the light by a woman. I guess the result is that you can sell tons of product. There's probably some truth in that stereotype, which my wife could attest to, but it's hardly the reality. It's getting old in the tooth, and it's not even funny anymore.

Now, another style of advertising is gaining ground, which we'll call "age bashing." Basically, the premise is that old people are stupid. One insurance company's ads stand out: Oldsters pin photographs to a real wall and invite their friends over for a look, or they happen to like their old 25-inch color TV, or they smash pieces of candy on the table with a hammer. It's hilarious, until about the hundredth time you've seen it—then you realize they're talking about you. You're supposed to be in on the joke, but what if you really do like your 1974 Magnavox color console? It was made in America and still probably works.

SRT's 707hp Hellcat engine: Unapologetically designed and built for guys like us. How many products in today's politically correct society can you say that about?

Both Hollywood and Madison Avenue have decided, *de facto*, that we are disposable consumers. In the best case, we're not worth marketing to, and in the worst case, we're the butt of endless jokes. I shouldn't really care that much, and my skin ought to be thicker than that, but it gets to me. We're just not on their radar screen.

That's a shame, because in 2014, American males between the ages of 45 and 65 (I'm 51 in case you're wondering) are the wealthiest demographic group on the planet—in history. I'm not what you'd call rich, but as a group, we are in our peak income-earning years, and we save—then spend—absolutely huge amounts of money relative to the rest of the world. We spend it on stuff like hot rods, hand-wired guitar amps, custom guns, fishing boats, handmade watches, off-road vehicles, hunting dogs, RVs, tons of tools, NASCAR tickets, fine cigars, 25-year-old scotch, vacation homes, and a whole bunch of other junk youngsters don't understand.

When you reach a certain age, you figure you've worked hard, and after raising a family and building a career or business, you deserve to indulge in a vice or three. The thing is, by the time we get to that point in life, most companies that make stuff mysteriously start ignoring us. How ironic is that? They spend decades trying to con us out of money we don't have, then when we finally get some, they don't want it any more. *Sheesh*!

"...AS A GROUP, WE ARE IN OUR PEAK INCOME-EARNING YEARS, AND WE SAVE—THEN SPEND—ABSOLUTELY HUGE AMOUNTS OF MONEY RELATIVE TO THE REST OF THE WORLD."

Check this out: Of the three car commercials I watched on TV last night, two were luxury cars and one was a truck that crowded an MSRP of $40K. All three ads showed them being driven by fashion-conscious kids in their 20s. *As if*. Somewhere, there's a 24-year-old PR newb with a freshly minted communications degree (that his dad paid for) driving a second-hand Daewoo with a primered fender who story-boarded an ad with a young blonde in an evening gown pulling up to a mansion at sunset in a $45,000 Lexus. What drugs is this kid on? Better yet, what drugs is his boss on?

Most companies continue to do business as usual, blindly spending billions annually to court a mostly female 18- to 24-year-old audience. But not all companies, and not all products. Dodge's SRT

Hellcat Challenger and Charger are perfect examples of what can happen when a company comes to its senses and truly "gets it." It's as if Chrysler probed my brain, picked through all the rotten detritus, and pulled out every hidden automotive desire I've ever harbored. Then they built it and slapped a price on it that's tantalizingly affordable. A slightly smarter version of myself who makes slightly better decisions earlier in life could easily afford this dream car.

At the end of the day, the thing we want most in life is to be understood. To paraphrase self-help guru Stephen Covey, to understand somebody is to love them. In a bold move, Chrysler has gone to the trouble to understand *exactly* what we want in a car—with the emphasis on exactly. Then they went to the trouble to build it and price it within reach. Dodge CEO Tim Kuniskis has been quoted by *Automotive News* as saying about the Hellcat: "This is a car that most brands would never bring to market. This is a car that really absolutely does not have a business case for it. This is a car that doesn't fit in any automotive segmentation. This is a car that no customer has ever asked us to build…" Part of this statement makes no sense, because rarely has a product been so perfectly targeted for the world's most affluent segment—one that grows larger with every passing day. That this group is one that lives unacknowledged in the shadows is the real shame. I will agree with Tim that the Hellcat is not for women between the ages of 18-24, which has been pounded into every CEO's skull since MBA school as being the Holy Grail of marketing.

Dodge could've just left well enough alone with the 5.7L Hemi and the 392, but they gifted us with the Hellcat. So without going all mushy on you, what I'm saying quite literally is that Dodge loves us. They're not just paying lip service—they mean it.

It's actually a breath of fresh air to me that a company makes the stuff I like, then bothers to market it to me—without being all apologetic to the rest of the world about it. And in a broader sense, I appreciate all the manufacturers and advertisers in *Mopar Muscle* for the same reason. It's rare that the mainstream media seeks out older-guy money, and for that reason, I appreciate companies—both large and small—who court me with targeted products and advertising; they will always be the ones I gladly pull my wallet out for. Until then, let's hope more companies and advertising agencies grow some big hairy balls!

MASTHEAD

Mopar Muscle Magazine

www.moparmuscle.com

EDITORIAL

Muscle Car Group Director **Douglas Glad**
Editor **Johnny Hunkins**
Managing Editor **Laura Peltakian**
Contributing Editors **Christopher Campbell, Steve Dulcich, Mark Ehlen, Dan Foley, Stephen Kim, John Machaqueiro, Kevin McKenna, Jorge Nunez**

ART DIRECTION & DESIGN

Design Director **Markas Platt**
Art Director **David Wardrop**

MUSCLE CAR GROUP ON THE WEB

www.carcraft.com
www.moparmusclemagazine.com
www.musclecarreview.com

MANUFACTURING & PRODUCTION OPERATIONS

VP, Manufacturing & Ad Operations **Greg Parnell**
Senior Director, Ad Operations **Pauline Atwood**
Director, Publishing Technologies **Dale Bryson**
Archivist **Thomas Voehringer**

ADVERTISING INFORMATION

Please call MOPAR MUSCLE Advertising Department, (949) 705-3179. Related publications: Automobile, Car Craft, Chevy High Performance, Circle Track, Classic Trucks, Diesel Power, Dirt Sports & Off-Road, 8-Lug HD Truck, Engine Masters, European Car, 4-Wheel & Off-Road, Four Wheeler, Hot Rod, Hot Rod Deluxe, JP, Lowrider, Mopar Muscle, Motor Trend, Muscle Car Review, Muscle Mustangs & Fast Fords, Mustang Monthly, Recoil, Street Rodder, Super Chevy, Super Street, Surfing, Truck Trend, and Vette.

SUBSCRIBER SERVICES

For subscription assistance or address changes, email moparmuscle@emailcustomerservice.com, call 800/777-2668, 386/447-6385 (International), or write to Mopar Muscle, P.O. Box 420235, Palm Coast, FL 32142-0235. Please include name, address, and phone number on any inquiries. Occasionally, our subscriber list is made available to reputable firms offering goods and services that we believe would be of interest to our readers. If you prefer to be excluded, please send your current address label and note requesting to be excluded from these promotions to Source Interlink Media, LLC, 831 S. Douglas St., El Segundo, CA 90245, Attn: Privacy Coordinator. Canada Post: Return undeliverable Canadian addresses to IMEX Global Solutions, P.O. Box 25542, London, ON N6C 6B2.

Back Issues: To order back issues, visit www.simbackissues.com.

Reprints: Contact Wright's Media at 877-652-5295 (281-419-5725 outside the U.S. and Canada) to purchase quality custom reprints or e-prints of articles appearing in this publication.

Please Recycle This Magazine
Remove Inserts or Samples Before Recycling

MOPAR MUSCLE

INSIDE HELLCAT

WE TAKE A HARD LOOK AT DODGE'S PARADIGM-SHIFTING 707HP HEMI TO SEE WHAT MAKES THE BEAST ROAR SO LOUD.

BY JOHNNY HUNKINS ✪ PHOTOGRAPHY BY THE AUTHOR

The year 2014 is the one when we forever change the way we think about making horsepower. For decades, this author has written cover blurbs shouting the tips, tricks, and how-to's for building engines in the 400-, 500-, 600-, and 700-hp range. Like a carnival hawker, we lure readers into the inner sanctum of power on the promise of faster, cheaper, or easier performance. Even in the best how-to scenarios, it's up to you, the reader, to gather the right stuff, to know how to bolt it together, and to maintain your new powerplant in good health. We don't plan on walking away from any of that at *Mopar Muscle*, however, with the news of a smog-legal, 707hp engine that gets 22 mpg on the highway and that comes with a 100,000-mile warranty that even covers racing—well, we don't have anything reserved in our back pocket for that.

If it is possible to achieve mechanical nirvana in the hot rodding world, the Hellcat Challenger is by far the best candidate out there. To put it into perspective, imagine you went to a world-class hot rod shop and asked them to build a '71 Challenger with a 700hp fuel-injected Hemi, 22 mpg, an eight-speed paddle-shifted transmission, IFS, IRS, ABS, stability control, a custom leather interior, 1g handling, giant Brembo brakes, an earth-shaking infotainment center, and by the way, you want a five-year warranty and a guarantee that it runs 10s on slicks, and you've only got $60k. *Yeah, right*. Or, you could go to your neighborhood Dodge dealer.

At the center of the cost/performance equation is the SRT Hellcat Hemi engine. Its 6.2 liters of displacement are fed by a 2.4L IHI-sourced supercharger that incorporates dual heat exchangers

"...in its dumbed-down black-key 'valet' mode, Hellcat's power is limited to around 500 hp, or roughly the peak output of last year's Corvette Z06."

Our quest for Hellcat knowledge brought us to the Chrysler Technical Center in Auburn Hills, Michigan, where we examined this very elaborate cut-away model of the Hellcat. Windows have been cut out to reveal key features and colored lights call out specific systems: green for coolant, orange for crankcase oil, red for exhaust, amber for combustion, blue for intercooled charge.

The Hellcat's cast-iron block is powder-coated Hemi Orange, and is nearly indistinguishable from the Apache 6.4L (392ci) block in all but a few key areas. Note the four plugs in the lifter galley—these are part of the lube circuit for MDS cylinder deactivation in the Apache and are not used in the Hellcat.

on an independent low-temperature cooling loop. Cool, dense air is forced into hemispherically shaped combustion chambers to the tune of 11.7 psi. The Hellcat's full-floating 9.5:1 forged pistons keep their cool with revised oil squirters, then transmit power through new powder-forged, steel connecting rods to a forged crankshaft with heat-treated, micro-polished journals. And here's where we are slapped into reality with yet another revelation: when operated with its dumbed-down black-key, Hellcat's power is limited to around 500 hp, or roughly the peak output of last year's Corvette Z06. Even the new Z06's celebrated LT4 with 650 hp can't make the Hellcat break into a sweat—and it costs $19,000 more.

If you're wondering "how'd they do *that*?!" you aren't alone. We wondered the same thing, so we got in touch with Dodge and got permission to sit down with Chris Cowland, Chrysler's Director of Advanced and SRT Powertrain, and Gregg Black, Chief Engineer on the Hellcat engine, and ask every question we could think of. Our story took us to the Chrysler Technical Center in Auburn Hills, Michigan, where we got the opportunity of a lifetime to put our hands on all the Hellcat's parts, and even watch a Hellcat run a treacherous thermal load test on the dyno in the D wing of Chrysler's expansive powertrain center.

91 PERCENT NEW

When Dodge announced that the Hellcat was 91 percent new, a lot of questions went through our head. The word *new* is a hot button that we in the media (and PR guys at manufacturers) like to use to elicit interest, but to a hot rodder who likes to mix and match parts Frankenstein style, it can spell frustration. In this regard, the Dodge boys were guarded in their answers, and you'll be left to speculate on your own. Can the Hellcat crank fit in a 392 Apache block? Can you put a Hellcat manifold and blower assembly on a 6.4L, 6.1L, or 5.7L long-block? Should you use a Hellcat block for a bitchin naturally aspirated buildup? What kind of interchangeability is there between the Hellcat's parts and previous Hemi variants? All of these are great questions, and nobody will know the answers for certain until somebody tries. Nevertheless, we have some facts that give important hints about mixing and matching Hellcat parts, especially with the 392 Apache variant.

One of the questions we asked the engineering team was, "what do you mean by 91 percent new?" The answer is: Relative to the 392 Apache Hemi, the cumulative dollar value of the parts that got design changes or material upgrades is equal to 91 percent of the engine's value. Parts that got changed that were of higher value, such as the block and cylinder heads, carry more influence on the equation than small, simple stuff like fasteners. Moreover, and perhaps more importantly, it turns out "new" doesn't necessarily mean incompatible with parts on an earlier Hemi variant. And while Dodge understandably won't confirm, for instance, that a Hellcat piston will fit in an Apache's bore, the evidence is that it could. That kind of speculation is our job,


This cutaway of the Hellcat display shows in green the cooling jackets. Note how they extend from the top of the fire deck all the way down to piston bottom dead center. The thermal load on the 485hp Apache is not as high, so its water jackets do not extend this far down.


Here's where we see another major improvement to the Hellcat. The deep-skirted cross-bolted main caps are a design carry-over from previous Hemis, but the main webbing between the cylinder bores and mains has been beefed up.


This close-up of the Hellcat block of the pan rail area shows what will already be familiar to many builders of 5.7L, 6.1L, and 6.4L Hemis. The cylinder walls have been tied to the pan rails with plenty of material from day one of the Gen III Hemi (2003), and remain that way here in the Hellcat.

and we'll do our best to paint an accurate picture here.

To sum it up: The Hellcat is pure Hemi architecture, and you will immediately recognize it as such. With the large 4.09-inch bore of the 392 Apache, and the short 3.58-inch stroke of the 5.7L and 6.1L Hemi, there is much in common with prior Gen III Hemis. The engineering team added to the Hemi's already great design features like the hemispherical combustion chamber and the deep-skirted, cross-bolted block by leveraging them with evolutionary changes in materials and design. They did not change key dimensions like bore spacing, bore diameter, main and rod journal diameter, rod length, deck height, cylinder boltholes, cam location, cam journal diameter, or other critical areas. And for good reason—the Hellcat needs to package into the same space as other Hemi variants and be easily serviced, so the more that can stay the same in meaningful ways means less cost for the car, and we're all for that!

SHORT-BLOCK

The engine block is the bedrock of the Hellcat. All 707 of the Hellcat's horsepower get transmitted through the block, which is made of cast gray iron. Outwardly, it looks very similar to the Apache block that underpins the 392, but there are two primary changes—three if you count the standard Hemi Orange powdercoat paint! During development, it was discovered that a significant change in the coolant circuit was needed in order to manage the Hellcat's increased thermal output. Specifically, the water jackets now continue all the way down to a level equal with the piston crown's bottom dead center. Second, the amount of material in the webbing between the bores and the main caps has been increased. Lastly, the piston oil squirters have been retargeted to cool a slightly different region of the piston, which itself is significantly different than the cast piston in the 392 Apache. These revised squirters also have a pressure-sensitive lube valve to shut off flow to them at low pressure; this is done to prioritize volume and pressure to the rest of the lube circuit.

The difference in displacement between the 6.4L Apache and the 6.2L Hellcat is all in the stroke (3.72 inches versus 3.58 inches), so the rotating assembly is different dimensionally. The Hellcat's shorter-throw forged steel crank is actually machined from the same forging as the longer stroke Apache crank, but because of increased journal overlap, it's stronger. Moreover, the surface of the Hellcat crankshaft is induction hardened, and all journals are undercut, fillet rolled, and micro-polished to very tight tolerances. On the front counterweight you will see a laser-etched QR code; the manufacturing information for each crankshaft is unique, and the code is tied to a specific date, time, and place of manufacture. A line of alphanumeric code is also laser etched near the QR code and denotes a sequence of specific-sized select-fit bearings that are to be installed in each journal. The result is a bearing interface with extremely precise tolerances that can handle enormous amounts of surface loading.

On the end of that crank is a Hellcat-specific damper designed to withstand an impressive 13,000 rpm. That damper is fitted to the Hellcat's crank snout with a diamond-like carbon-coated washer and damper bolt that is 2mm larger than the one in the Apache. That snout likewise has a strengthened fillet radius for additional fatigue resistance. All that beefcake adds up to an assembly that can easily weather years of side-loading from the Hellcat's 10-ribbed drivebelt.

The Hellcat's rods—which are the same length as the Apache's—are of a forged powdered steel construction, and are upgraded relative to the Apache rod with proprietary metallurgy. The rod's small end receives a full floating pin in a bronze bushing; it has an interesting detail in that it is the full width of the rod's cheek on the compression side of the small end, but a machined taper was given to reduce its mass at the top of the small end. The Hellcat's steel piston pins have a diamond-like carbon coating, and are some of the tightest-fitting, precision-machined pins we've seen. And coming full circle, keeping those pin clearances tight at full rated power when the heat is on is the job of the piston oil squirters, which play a huge role in the thermal management on the top side of the short-block. Make no mistake, this is what we normally encounter when we examine top-shelf race hardware—there is no skimping here!

Moving up the rod to the piston, we see big changes relative to Apache. A forged piston was the only type considered by the Hellcat's engineering team. To wit: At full rated power each piston sees the force of 22,000 pounds on every combustion cycle at full-rated power. With strength a priority, the Advanced and SRT Powertrain team went to work with some very interesting tools, the first of which is a computer model called finite element analysis (FEA). This allows engineers to design a virtual piston and place virtual mechanical and thermal loads on it to identify weaker areas. It saves hundreds of man-hours

"Make no mistake, this is what we normally encounter when we examine top-shelf race hardware—there is no skimping here!"

The Hellcat's forged crank is carved from the same steel forging as the 392 Apache, with a few key differences. The stroke is ground to a shorter 3.58-inch throw (the same as the 5.7 and 6.1), and all bearing surfaces are induction hardened prior to being given a fillet roll. A micro-polish finish is then given to all journals.

A bottom view of both the cast Apache 392 piston (*left*) and forged Hellcat piston reveals a significant difference in design. Note how the support ribs of the Hellcat piston intersect more centrally with the pin boss.

prototyping and testing parts, and moves a more proven product to market faster. The next powerful tool the team used for the piston design was thermal telemetry. Advanced and SRT Powertrain built a prototype engine with thermo-couples attached to the pistons; as the engine runs through its battery of tests, it's possible to see in real time the thermal stresses across the piston. This proved out the earlier FEA work, while allowing the team to further refine the piston design.

A cursory inspection of the Hellcat piston alongside a 392 Apache piston reveals much. Most obvious is the Hellcat's forged design versus the Apache's cast design. And while both have anti-scuff, oil-shedding coatings on their skirts, the shape of the skirts themselves are quite different. The Hellcat's is noticeably wider at its base and its support ribs intersect more critically with the pin boss nearer the center of the piston. Up top, a gradual reverse dome gives the Hellcat a 9.5:1 compression ratio, while the Apache's slight positive dome delivers a higher 10.9:1 compression ratio. On the profile, most noticeable is the .070-inch taller compression height of the Hellcat slug (Hellcat specs out 1.28 inches to the Apache's 1.21 inches). That places the extra .070 inch (a total of .09 inch crown height) right up top at the piston crown, which allows the Hellcat to better withstand the Hellcat's higher temperature and cylinder pressure. Along with the shorter-stroke crank, it's here that we see the genius of the displacement give-back relative to the Apache—those .2 liters of lost displacement have endowed the entire short-block with the strength needed to back a 100,000-mile powertrain warranty that even covers racing.

CYLINDER HEADS

In the pressurized environment of the Hellcat's induction system, the priorities within the cylinder head and valvetrain shift somewhat from outright flow, to thermal management. While flow is still a priority, the swift, efficient movement of heat out of the system takes on a new magnitude of importance. As for the flow

Each Hellcat crank has a unique laser-etched QR code linked to pertinent manufacturing data. The sequence of letters above it correspond to select-fit bearings in sizes A, B, and C, which have an incremental difference between them of .00031 inch. (As a point of reference, aftermarket select-fit race bearings are typically offered in +.001 over/under increments.) When the crank is manufactured, the measurements are taken and the corresponding bearing number is etched on the crank. When the engine is built, the numeric code tells the assembler which select bearing to use for each clamshell.

itself, the capacity engineered into the 392 Apache cylinder head is already significant; its nearly 350 cfm of intake port flow right off the assembly line would've been the stuff of dreams even in the aftermarket just a few years ago, and here the Hellcat largely echoes the Apache design. The Gen III Hemi's combustion chamber shape with its 34.5-degree included valve angles already give it a huge advantage, and what made the original Hemi such an overwhelming success in supercharged drag-racing circles all those decades ago still holds true today. A hemispherical-style roof means the flow around the valves—particularly the intake—isn't as shrouded against the cylinder wall, and it also means bigger valves can be used for any given bore diameter—a double dose of goodness. While the Gen III Hemi is light-years ahead of earlier Hemis in terms of combustion dynamics, the basic advantage of a hemispherical chamber in supercharged situations still holds to this day.

Like the 392 Apache cylinder head, the Hellcat cylinder head benefits from the extensive use of computational flow dynamics, or CFD. This gives a very accurate picture of the particle motion within the flow path, and produces

Up top, this side-by-side comparison shows how the Hellcat piston has significantly more meat above the ring land (*right*) than the naturally-aspirated Apache piston, a result of having .07-inch more compression height. This angle also shows the difference in the piston crown, with the Apache exhibiting a slight dome, and the Hellcat a slight concave shape.

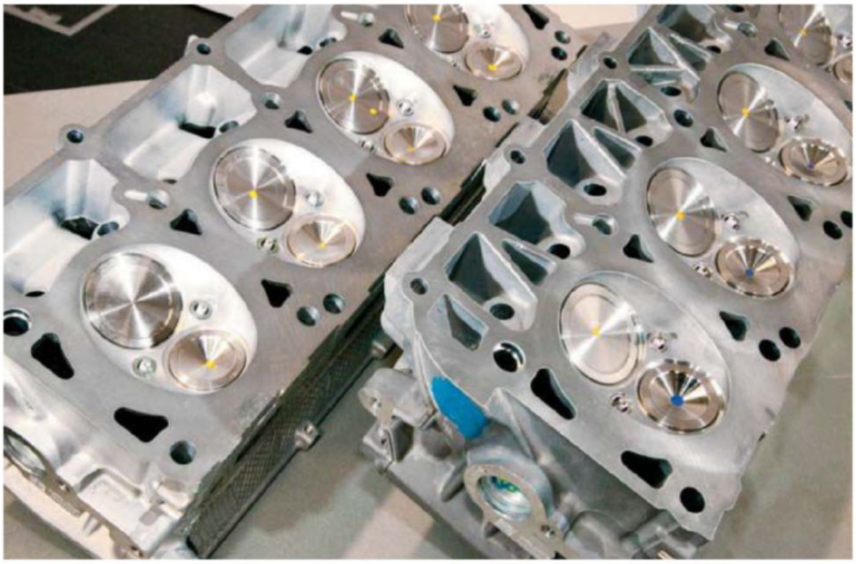
amazingly granular models of velocity, pressure, density, and temperature. We combed over the Hellcat and Apache head castings loaned to us, and could find very little difference between the two, save for a different appearance in the casting texture and some changes in the mold fixture's parting lines. Port shape, contour, and location seems the same, as do the valve angles, valvetrain hardware, and bolt locations. Of course, there are features added to allow the supercharger to be screwed down to the engine, as well as some additional bosses for the unique supercharger drive system components that you won't find on Apache heads.

In the Hellcat's cylinder head design, the main focus appears to be the effective evacuation of heat. To that end, the Hellcat's cylinder heads use a heat-treated 356-T6 aluminum alloy, which conducts heat at a faster rate than the Apache's 319 alloy. The casting itself has strengthening gussets cast into the deck face behind the intake ports; these help carry heat away from combustion while providing a stable bulwark for the large manifold/blower assembly.

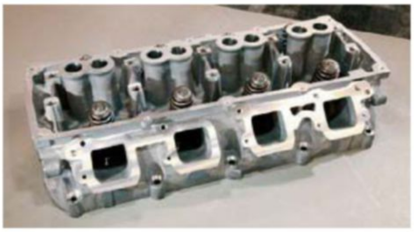
At the fire deck level, the Hellcat employs all-new multi-layer steel (MLS) head gaskets. These are designed to retain the 110 bar of cylinder pressure at rated power, while providing a comfortable

The Hellcat rod is full floating with a bronze bushing, and is paired to a diamond-like carbon-coated steel wristpin. Note the Hellcat's unique rod; the small end is the same width as the big end in order to better support the combustion pressure, and the top is tapered for a marginal savings in mass. It's all race-quality stuff.

The Hellcat's powder-forged steel rod is by far the toughest in the Gen III Hemi family, and would make a good candidate for use in an all-out naturally aspirated 5.7L or 6.1L buildup.



Compared to the 392 Apache head, the Hellcat head (*right*) looks very similar. Nevertheless, the Hellcat heads are cast at a specialty low-volume foundry using Hellcat-specific tooling. The Apache is a 319 alloy while the Hellcat is a premium heat-treated 356-T6 alloy, giving it higher thermal conductivity and improved elongation (one of the measures of an alloy's strength). Of note are the differences in the valves. Hellcat's are the same size as Apache, but are materially different, with the intake being hollow-stemmed and the exhaust being sodium filled.



The Hellcat cylinder head flows essentially the same as the 392 Apache, with intake ports that tickle the 350 cfm range at .600-inch lift. Beehive springs keep valvetrain dynamics stable up to the Hellcat's electronically limited 6,200-rpm redline.

A tighter view of the Hellcat's combustion chamber and 34.5-degree included valve angle.

margin of safety in all operating scenarios. They have also been subjected to extreme thermal shock testing on the dyno to simulate extreme changes in thermal and mechanical loading. Through testing, it was deemed that a unique four-layer MLS gasket was best for coping with the differential rates of expansion between the iron block and aluminum heads, while also being able to provide the superior sealing needed for a high-powered supercharged engine.

On the valve side of things, sizes stay the same as the mega-flowing Apache head, with 2.13-inch intakes and 1.65-inch exhausts. The difference is, once again, in what Dodge did to manage heat. The Hellcat's intake valves are hollow stemmed, giving them a nice mass reduction, and the steel alloy-headed exhausts are filled with sodium, which when brought to operating temperature turns to a highly heat-conductive liquid state. At this power level, heat becomes such an enemy that ignoring it will cost you more than power—it will cost you parts, so in this sense good thermal management not only equals more power, but an engine that can go the distance.

INDUCTION

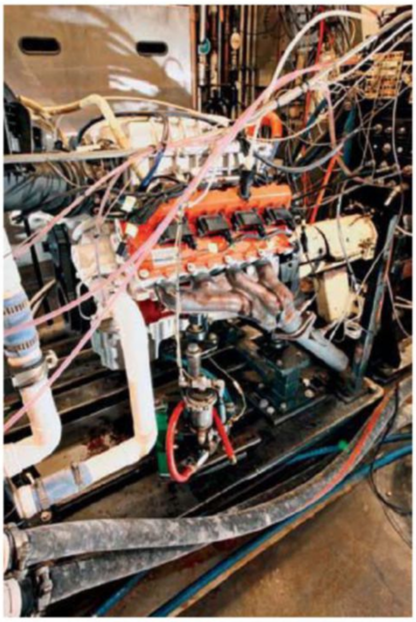
On its face, a supercharger performs a very simple function—it uses mechanical energy from the engine's crankshaft to power a compressor that forces air into the manifold. In practice, however, there are many more nuanced functions a supercharger assembly has to do for it to function efficiently and last the long haul. Blowers on automotive engines are not new—but having one that produces this level of power reliably in a production car that gets 22 mpg is new, exciting territory.

For the Hellcat's supercharger, Dodge reached out to IHI, a Japanese technology giant that is not well known for its work with domestic auto manufacturers, but nevertheless has vast industrial experience going all the way back to the 1850s. IHI's expertise in compressor design has made it a go-to company for outfits like Boeing, GE Aviation, Mercedes' AMG division, Fuji Heavy Industries, Mitsubishi, and Kawasaki, and here Chrysler felt more than comfortable partnering with such a strong engineering force.

At full tilt, the IHI huffer can move 30,000 liters of air per minute running at 14,600 rpm, thanks to a 2.36:1 drive ratio. It does this with high-helix rotational-pull die-cast, PTFE-coated aluminum rotors that displace a tick shy of 2.4 liters every rotation, and for those keeping count, that's 41 percent more volume than the Eaton supercharger in the '15 Corvette Z06. Comparison with the Corvette's LT4 is inevitable, and here a couple of hard facts may prove informative. GM's 1.7L compressor sees a peak speed of 20,000 rpm on the same size engine. Relative to the Hellcat, there is little room on the LT4 for increasing boost via a smaller pulley—it's tapped out—and even if you could overdrive the LT4's Eaton compressor, it's probably a bad idea. That's because GM's air-to-liquid intercooler operates on a high-temp cooling loop with the engine, limiting boost to 9.5 psi, and limiting air density due to its less efficient heat exchanger.

Internally, the IHI compressor, manifold, and plenum benefit from a significant

The Hellcat's MLS gasket is well up to the task of retaining nearly 1,600 psi of cylinder pressure at full rated power. It has also proven it can repeatedly withstand the rigors of extreme thermal expansion and contraction without losing seal.

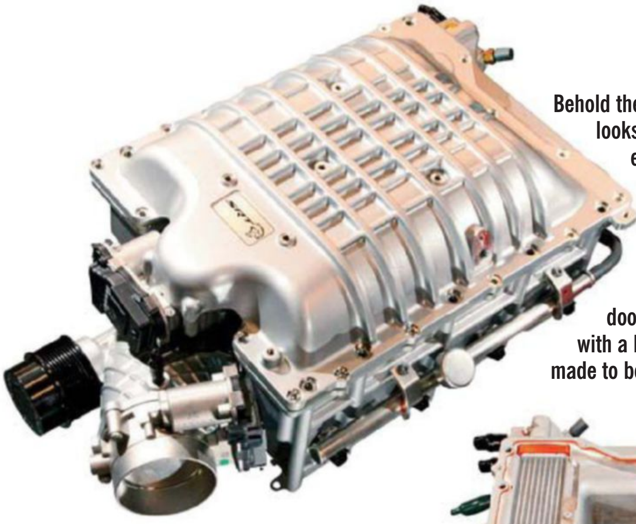


In this deep thermal shock test, the Hellcat has been fed a diet of minus 40-degree coolant (At that temp, Fahrenheit and Celsius are the same.) Those pipes are not white plastic, they're frosted-over metal, and the frost covers most of the engine too. For the test, the dyno operator fires up the engine and immediately runs it to peak torque. This is essentially a gasket sealing test.

amount of CFD simulation at both Chrysler and IHI, whereby the distribution of flow has been carefully modeled to ensure it is even across all cylinders. This flow path was modeled from the throttle-body inlet, through the screws and into the plenum, then across the heat exchangers in both banks, and finally into the cylinder head intake ports.

LOW-TEMP COOLING LOOP

This brings us to the Hellcat's knock-out punch—the supercharger's low-temperature coolant loop. Here's a little known secret: In the boosted powerplants of most manufacturers, the rated horsepower is only valid under normal highway use for a limited period



Behold the blower assembly as it looks divorced from the Hellcat engine. If you think it might look good bolted to the top of your hemi short-block, you're not alone. We can easily envision this thing coming to our door on a UPS truck—and with a little ingenuity, it can be made to bolt on.

of full-throttle time. For safety's sake, once the air charge temperature elevates to levels where detonation and knock begin (such as at a race track) the engine controller limits ignition and boost to save the engine. This is called de-rating. When you see guys at the dragstrip packing their manifolds with ice before a run, they're trying to avoid de-rating the power of their engine.

With the Hellcat, the air-to-liquid intercooler operates on a low-temperature cooling circuit that is independent of the engine's cooling system. Competing powertrains operate on the same high-temp cooling loop as the rest of the engine, limiting their intercooler efficiency. By running a low-temp loop, the Hellcat's two heat exchangers—one in each bank of cylinders—can produce a much greater temperature differential. This system is so effective that the Hellcat can be driven for 20 laps on a 3.1-mile road course in 100-degree ambient heat without the engine power de-rating. (Among one of the torture tests Dodge engineers conducted was a grueling 24-hour endurance test at Nelson Ledges road course in Ohio.)

There are two other notable airflow features of the Hellcat's induction system. The first is an Air Catcher inlet port in the driver-side inboard marker light. By taking fresh ambient air from outside the engine compartment, the density of the air charge entering the engine is increased. The second airflow bump comes from the Hellcat's 92mm throttle body, the largest ever used in a Chrysler production car. The large orifice means pumping losses past the throttle's choke point are minimized, and that shows up as power at the wheels. Unlike carbureted cars of yore, no venturi effect is needed to siphon fuel into the air stream, so bigger really is better when it comes to throttle body diameter.

From the standpoint of driveability and durability, Hellcat has two other

With the lid removed, we see the high-pressure discharge side of the IHI supercharger and the two heat exchangers—one located in each cylinder bank. The 92mm throttle body feeds air to a cavity below the bypass valve, routing the flow into the screws.

The bypass valve inside the Hellcat's super-charger assembly is actually a repurposed throttle body from a four-cylinder engine. The natural state for the unit is open instead of closed—opposite of a throttle body. When your throttle foot goes down, the bypass shuts, instantly creating boost.

interesting features. An electronically controlled internal bypass valve located between the inlet side and the discharge side of the compressor allows air to move directly into the intake ports without

Peering into the cutaway on the Hellcat's manifold, you can see how the high-helix rotors of the IHI supercharger trap air between the rotors and not against the housing—a feature that keeps charge temp down. This view also illustrates the dense packing of layers in the heat exchanger core.

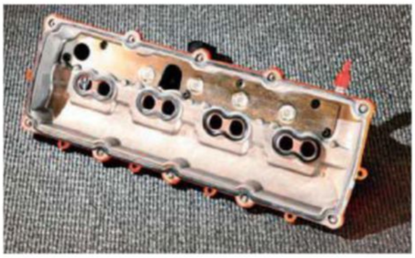
The Hellcat relies on traditional fuel injection rather than direct injection to feed the cylinders. That's good news for hot rodders. The Hellcat's 600cc/min fuel injectors can empty the SRT's 18.5-gallon fuel tank in about 13 minutes at full power.

being compressed. Under low load and off-throttle conditions, it lowers parasitic drag on the engine and reduces wear on the compressor. The other feature is a decoupler—a one-way mechanical diode—inside the supercharger pulley, which only allows torque to be transmitted in one direction. The compressor's rotors are then allowed to freewheel when engine speed suddenly drops, during shifts for instance, thus saving unnecessary wear on the compressor's geardrive and preventing problematic drivebelt dynamics.

CAMSHAFT

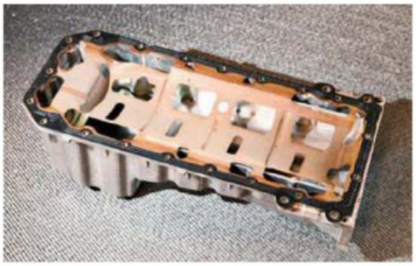
If you want to make the kind of power that the Hellcat makes, you will need to move some air. Typically, that involves

A close-up of the rotors in the IHI blower reveals the PTFE coating solid-film lubricant, which gives them a satin-black texture. This keeps friction and heat down.



The shape of the Hellcat's Hemi Orange valve cover has an unusual appearance due to an ingenious air/oil separator. The raised slab section of the valve cover is home to a labyrinth that draws crankcase pressure through it. Oil mist and air go in, but air and oil go out their separate ways.

a discussion about the valvetrain, and that certainly applies here. As mentioned before, a combustion chamber with a hemispherical layout has several inherent advantages, one being the potential for fitting valves with larger diameters, the sum of which being greater than the cylinder bore's diameter. Along with the fact that the valves are unshrouded from the cylinder walls, the hemi chamber has an airflow rate not unlike a multi-valve engine—only without the added complexity and mass. What this means is that relative to an engine with a typical wedge-shaped chamber, the hemi can move a similar volume of air using less camshaft. Adding a blower—and its attendant airflow—to the hemi equation means we need an even less aggressive intake valve event, which spells better efficiency all around. With the cylinder being filled under pressure from the blower, getting the air mass into



Most production engines at the Hellcat's power level rely on complicated, expensive, dry-sump lube systems to get the job done, but Advanced and SRT Powertrain used a larger displacement pump in a wet sump system to feed the increased needs of the Hellcat's bearings, variable cam timing, and cooling jets. The openings were engineered to encourage the oil to be stripped from the rotating components, creating a highly effective crank scraper/windage tray.

This grouping of parts shows all the key pieces in the Hellcat's valvetrain. Hydraulic roller lifters are the same ones used in the 392 Apache (non-MDS), which act on hardened pushrods and a super-stable shaft rocker system. Hellcat's cam sports dramatically different lobe profiles than its Apache sibling, with reduced intake lift/duration but greater exhaust lift/duration.

the cylinder is far less problematic than getting it out. That said, it should come as no surprise that the intake specs for the Hellcat's hydraulic roller camshaft are slightly milder than the 392ci Apache. (Intake valve lift is reduced from .577 inch on Apache to .561 inch on the Hellcat. Duration likewise goes from 286 degrees at .006-inch lift to 278 degrees on the Hellcat.)

On the exhaust side, the need to expel the spent gases is vastly increased over the Apache. To that end, the Hellcat's exhaust timing is expanded by an additional 16 degrees in length (304 degrees versus the Apache's 288 degrees at .006-inch lift) to improve blow-down. Exhaust valve lift also gets a bump, going from .537 inch on the Apache to .551 inch on Hellcat. With the Hemi's ability to vary cam phasing, the valve events can be altered to favor different load and emission regimes, such that the intake closing and exhaust opening events can be advanced at full throttle and higher rpm to increase power,

Edelbrock HEMI® VICTOR JR. CNC HEADS WILL TURN YOUR ELEPHANT INTO A RAGING PACHYDERM!

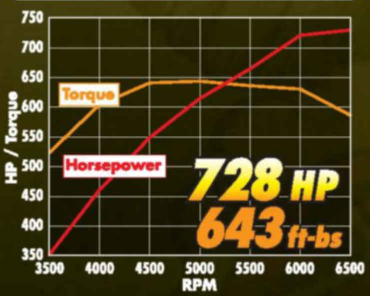
EDELBROCK CYLINDER HEADS ARE MANUFACTURED IN THE USA FOR UNSURPASSED QUALITY

MADE IN USA

SPECIFICATIONS

Chamber Volume:	170cc
Intake Port Volume:	245cc
Intake Valve Size:	2.32"
Exhaust Valve Size:	1.94"
Exhaust Port Volume:	105cc
Maximum Lift:	0.700"

- *Designed for high output 650+ hp Chrysler 426-572 HEMI engines*
- *Features fully CNC'd combustion chambers and CNC blended seats for optimal air flow performance*
- *Revised exhaust valve angle to accommodate larger intake valves*
- *Designed for use with stock rockers and shafts*
- *Brass tubes installed in exhaust pushrod holes to allow maximum clearance with minimal port intrusion*
- *Retains the stock accessory hole locations*
- *Available with springs for flat tappet and hydraulic roller applications*
- *Utilizes the standard exhaust port locations and for use with off-the-shelf headers*



These cylinder heads made a 42 hp improvement over our competitors design on a 528 c.i.d. Mopar Performance crate engine with a single-plane intake manifold using VP Racing Fuels C12.

#61175 and #61179 are complete and ready to run right out of the box.

#61169 are bare and supplied with reamed and semi-finished valve guides – will require finishing before installation.

#61189 are bare and supplied with reamed and semi-finished valve guides and a valve job to match the supplied valves (valves not installed). Will require valve springs, retainers, valve stem seals and valve locks.

FOLLOW US ON:

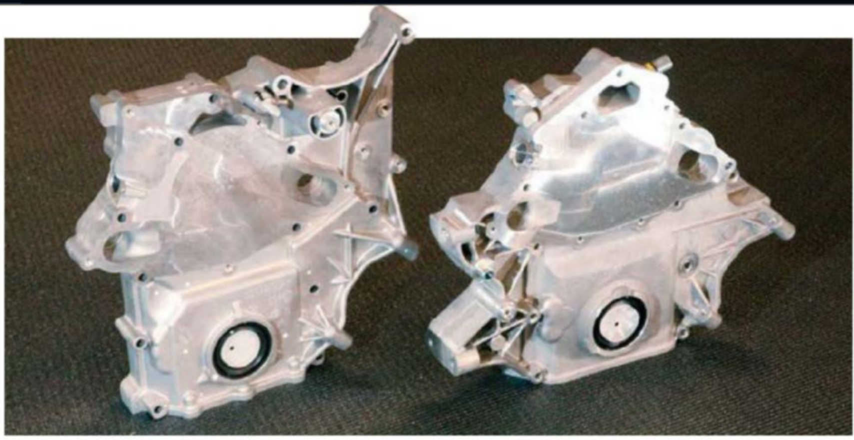
FOR MORE INFORMATION, VISIT EDELBROCK.COM/MOPARMUSCLE

Get FREE catalogs: 800.701.8739 Tech: 800-416-8628, 7am-5pm PST. M-F.

Edelbrock

All parts legal for use on Pre-Pollution Controlled Vehicles only.

This timing chain "kit" is a great example of how subassemblies of parts arrive for engine final assembly. Parts are packed into the shipping container, pre-indexed, and are ready to be installed with all fasteners. This one contains the crank timing gear, timing chain, cam gear, and VCT actuator. Other than DLC-coated washers added to the crank sprocket, it is the same one used in the Apache engine.



The front cover of the Hellcat (*right*) is considerably different than the 392 Apache cover. The different design is needed to accommodate the supercharger assembly and more complex accessory beltdrive system. Hellcat also has a slightly different water pump design. Any swap involving putting a Hellcat blower on a different hemi would certainly require this. There are differences in the fasteners as well, but figuring that out is what hot rodders do best.

The Hellcat's exhaust manifold looks more like a shorty header—its double-walled construction acts like an insulator and is designed to keep heat in for faster catalyst light-off. It also lowers underhood heat for longer life of engine bay components.

The ring pack must seal the engine effectively while providing the least amount of parasitic drag, and it must last much longer than what a competition engine might be expected to. Here the Hellcat uses a 1.2mm steel top ring with a high-velocity oxygen fuel (HVOF) spray barrel face and a manganese phosphate coating. The 1.2mm second ring has a recognizable micro-Napier face with zinc phosphate coating, and the 2mm three-piece oil ring has nitrided stainless rails and a stainless steel expander.

The Hellcat derives much of its class-leading power from the use of a low-temp cooling loop, and here we see one of the heat exchangers responsible for that right behind the SRT's grille. This one is the first to face the oncoming air; the second low-temp cooling circuit heat exchanger is behind the A/C condenser in front of the engine radiator.

Within the Hellcat's supercharger pulley is this de-coupler, which allows torque to be transmitted through it only in one direction. The coil on the inner spool expands against the drum of the outer pulley shell and locks it, but only when moved in one direction.

and reduced at lower rpm and low load for better fuel economy. To accomplish the dual goals of optimized power and economy, the engine management system has 37 degrees of authority over the Hellcat's camshaft timing, and operates through an electronically controlled lube circuit and assembly on the cam timing gear. The range of camshaft authority is the same for both Hellcat and Apache, in fact, the timing chain and VCT assemblies are mostly the same. The mapping for the camshaft phasing, however, is different.

Rounding out the valvetrain overview, the Hellcat's valves are moved by hydraulic roller lifters that are otherwise the same ones used in the non-MDS cylinders of the Apache 392. They likewise act on a very stable shaft-style rocker system comprised of investment-cast stainless steel rocker arms mounted to a pair of steel shafts: one for all the intake valves of each head, and one for all exhaust valves on each head. Lube is fed to the rocker trunnions via hollow hardened pushrods and pressurized lifters, as is standard per all Gen III Hemis.

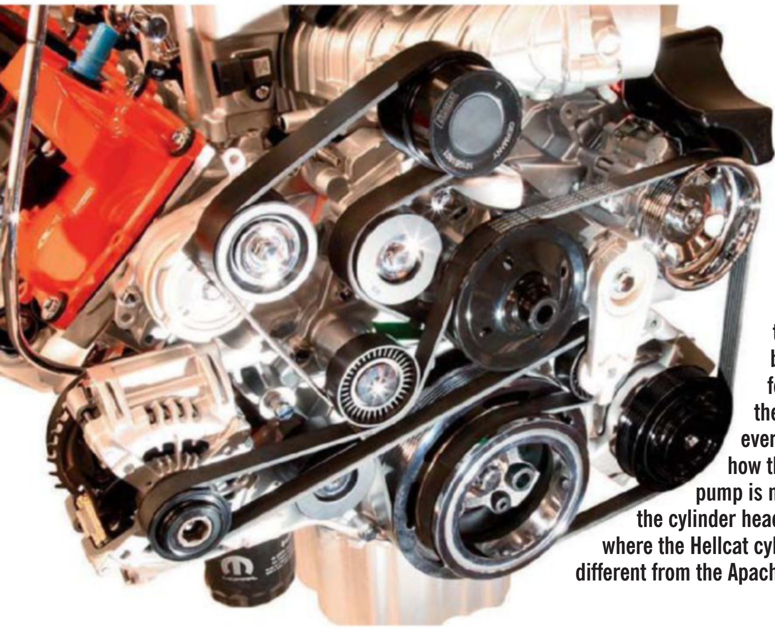
LUBE CIRCUIT

With engines of this power rating, we typically see exotic and expensive dry-sump lube systems, but the Hellcat's lube circuit is a model of simplicity and packaging relative to its competition. And while significant upgrades to the lube system in terms of capacity and electronic control have been made here, there is nothing about it that would be unrecognizable to most Gen III Hemi fans.

The Advanced and SRT Powertrain team recognized right away that the advantages of a wet sump system in terms of vehicle cost and packaging would be significant. The key was getting it to operate under extreme temperatures and g-loading without fail. Tight clearances and close tolerances in the bearings were critical, and we've already pointed out the lengths SRT has gone to in the implementation of select-fit bearings. At the pan, engineers used a sump with a close-fitting baffle that holds oil close to the pickup under extreme acceleration, cornering, and braking. An oil scraper/windage tray with an integrated over-molded perimeter seal is sandwiched between the pan and the block; this reduces friction on the rotating assembly from oil entrainment, and also mitigates foaming and aeration near the pickup. The oil is supplied to the engine with priority to the main journals via tight clearances, and also to the block's oil squirters, which have been targeted specifically for the crown and pin-boss area of the Hellcat's redesigned forged pistons. A residual pressure valve

GEN III HEMI BENCHMARKS

YEAR	CHANGES	HORSEPOWER
2003	5.7L GEN III HEMI INTRODUCED (3.92 BORE X 3.58 STROKE)	340 – 345 HP
2005	6.1L SRT8 HEMI INTRODUCED (4.06 BORE X 3.58 STROKE)	425 HP
2005	5.7L GETS MDS (MULTI-DISPLACEMENT SYSTEM) ON LX-SERIES CARS (CHARGER R/T, MAGNUM R/T, CHRYSLER 300C)	340 HP
2009	5.7L HEMI REDESIGNED AND INTERNALLY DESIGNATED “EAGLE.” VCT (VARIABLE CAM TIMING) ADDED TO ALL VARIANTS	363 – 375 HP
2011	“392” (6.4L) SRT8 “APACHE” ENGINE INTRODUCED (4.09 BORE X 3.72 STROKE) WITH VCT. MDS ADDED TO AUTOMATIC-EQUIPPED SRT PRODUCTS	470 – 475 HP
2014	“392” (6.4L) HEMI NOW AVAILABLE IN NON-SRT PRODUCTS	485 HP
2014	SUPERCHARGED 6.2L SRT HELLCAT HEMI INTRODUCED (4.09 BORE X 3.58 STROKE), 91 PERCENT NEW CONTENT	707 HP



This close-up of the accessory belt routing should give you an appreciation for the engineering that goes into belt dynamics and packaging. Note that there are two drivebelts—the inner one for the blower, and the outer one for everything else. Note how the power steering pump is mounted directly on the cylinder head—another area where the Hellcat cylinder head is different from the Apache.

shuts off squirter flow under low load.

The Hellcat’s mechanical oil pump also supplies lube to the VCT circuit to drive the phasing of the camshaft by means of an electronically controlled actuator, and like the Apache’s pump, has been designed for the added flow and pressure demands on the engine. Oil capacity for the system is a relatively thrifty six quarts, and SRT requires full synthetic with a 0W40 weight. Lastly, the lube system has been given a very ingenious oil/air separator that changes the physical appearance of the Hellcat relative to other Hemis. The tall coffers that are cast into the Hellcat’s orange powdercoated cast-aluminum valve covers are actually a maze of passages designed to separate the air oil droplets from the crankcase ventilation flow prior to being recirculated. The result of all this ingenuity is a lube circuit that can support an engine with the highest power output of any domestically produced car—and with simplicity and cost efficiency that beats all comers.

FINAL THOUGHTS

Clearly, Mopar fans have a lot to be proud of with the breakthrough Hellcat engine, but lovers of performance in every corner of the world can also enjoy the news. The Hellcat sets new performance and cost benchmarks that will have to be faced head on by all manufacturers who want to stay in the performance game. That’s good for all gearheads—but for now it’s best for the Pentastar proud. Getting a Hellcat engine, however, through any other means than buying an SRT Challenger or Charger could mean a wait. Typically, on a highly sought-after powerplant like this the demand for production engines comes first. Once pent-up demand is satiated can any thought of offering a crate engine be entertained. That said, we wouldn’t be surprised if the Hellcat Hemi crate engine was available as early 2016. Until then, you might want to keep your eyes peeled on the salvage yards. There will be a lot of testdrives given in the months ahead, and skill might not keep pace with enthusiasm in all cases—if you know what we mean! *MM*

FAST FACTS
6.2L SRT HELLCAT HEMI
ENGINE

TYPE: 370ci V-8

COMPRESSION RATIO: 9.5:1

BORE X STROKE: 4.09 x 3.58 inches

BLOCK: cast gray iron with revised cooling passages, reinforced webbing, revised and retargeted oil squirters

OILING: wet sump, 6-quart capacity, 0w40 synthetic required

ROTATING ASSEMBLY: induction-hardened forged steel crankshaft with micro-polished journals, rolled fillets, and select-fit bearings; powder-forged steel connecting rods; forged full-floating pistons with DLC (diamond-like coating) forged steel pins

CYLINDER HEADS: gravity-cast, semi-permanent mold, heat-treated 356-T6 aluminum; hemi-spherical chambers with hollow 2.13-inch intake valves and 1.65-inch sodium-filled exhaust valves

CAMSHAFT: hydraulic roller, .561-inch intake lift, .551-inch exhaust lift, 278/304 degrees duration at .006-inch lift, variable camshaft timing (VCT) with 37 degrees of authority via electronically controlled lube circuit

INDUCTION: IHI-sourced, liquid-intercooled, twin-screw supercharger with integral overrun decoupler, 11.6 psi of max boost, 14,600 rpm max blower input speed, 600cc/min fuel injectors, integrated electronically controlled bypass valve, 92mm fly-by-wire throttle body

INTERCOOLING: independent low-temperature cooling circuit with computer-controlled coolant pump, dual parallel heat exchangers in the intake (one per bank) and front-mounted heat exchanger cores

IGNITION: dual coil-over-plug, electronically controlled

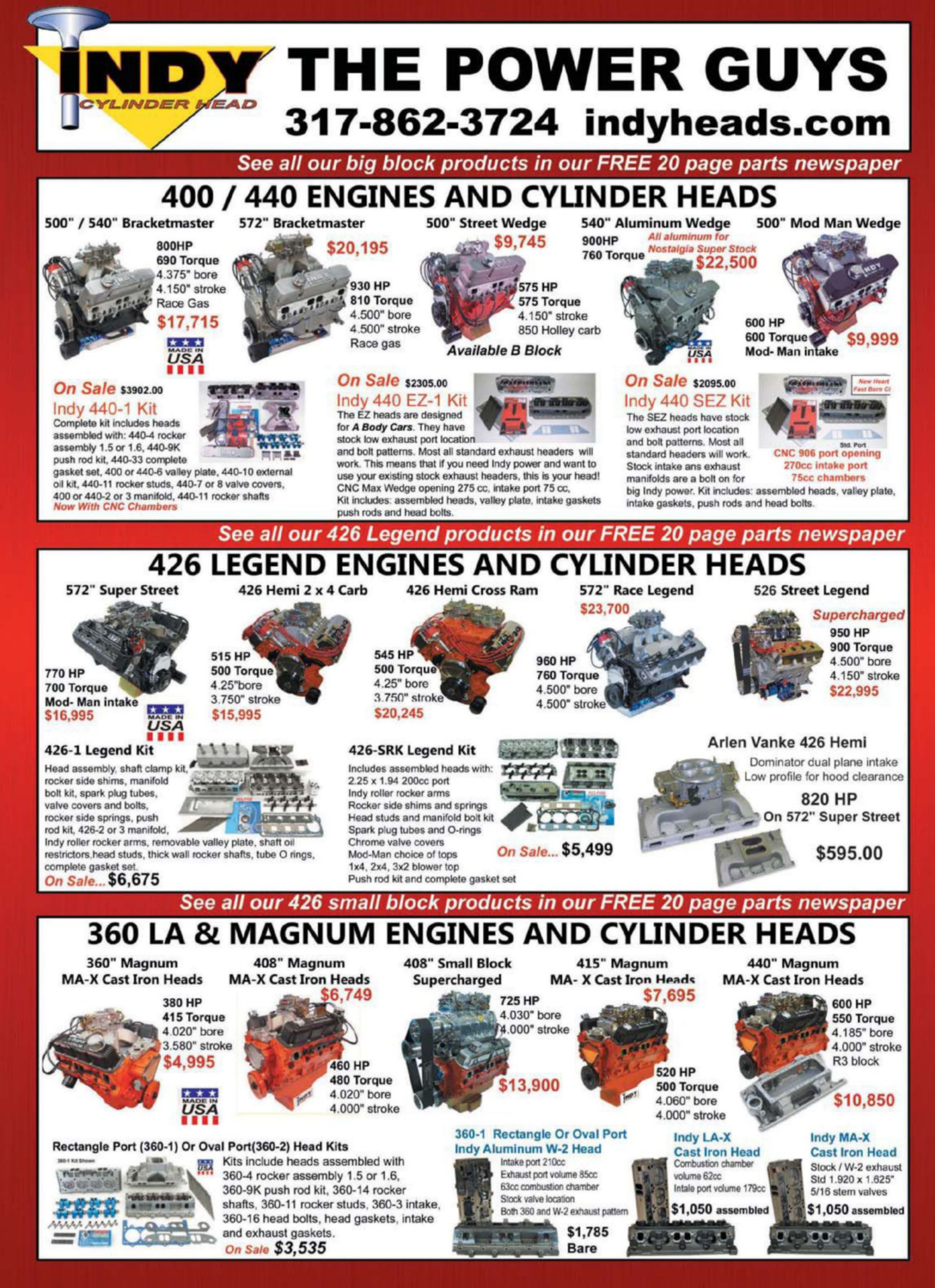
EXHAUST: dual 2.75-inch exhaust with twin electronic exhaust valves

FUEL REQUIREMENT: 91-octane minimum

OUTPUT: 707 hp at 6,000 rpm, 650 lb-ft at 4,000 rpm

MORE ONLINE

Go to MoparMuscleMagazine.com to watch our video interview of Gregg Black, Chief Engineer on the Hellcat engine, as we examine the Hellcat’s parts, and tour the dyno as Hellcat gets tested in a treacherous thermal shock test!


INDY CYLINDER HEAD
THE POWER GUYS
317-862-3724 indyheads.com
See all our big block products in our FREE 20 page parts newspaper
400 / 440 ENGINES AND CYLINDER HEADS
500" / 540" Bracketmaster
800HP
690 Torque
4.375" bore
4.150" stroke
Race Gas
$17,715
MADE IN USA
572" Bracketmaster
$20,195
930 HP
810 Torque
4.500" bore
4.500" stroke
Race gas
500" Street Wedge
$9,745
575 HP
575 Torque
4.150" stroke
850 Holley carb
Available B Block
540" Aluminum Wedge
900HP
760 Torque
All aluminum for Nostalgia Super Stock
$22,500
MADE IN USA
500" Mod Man Wedge
600 HP
600 Torque
Mod- Man intake
$9,999
On Sale $3902.00
Indy 440-1 Kit
Complete kit includes heads assembled with: 440-4 rocker assembly 1.5 or 1.6, 440-9K push rod kit, 440-33 complete gasket set, 400 or 440-6 valley plate, 440-10 external oil kit, 440-11 rocker studs, 440-7 or 8 valve covers, 400 or 440-2 or 3 manifold, 440-11 rocker shafts
Now With CNC Chambers
On Sale $2305.00
Indy 440 EZ-1 Kit
The EZ heads are designed for A Body Cars. They have stock low exhaust port location and bolt patterns. Most all standard exhaust headers will work. This means that if you need Indy power and want to use your existing stock exhaust headers, this is your head! CNC Max Wedge opening 275 cc, intake port 75 cc, Kit includes: assembled heads, valley plate, intake gaskets push rods and head bolts.
On Sale $2095.00
Indy 440 SEZ Kit
The SEZ heads have stock low exhaust port location and bolt patterns. Most all standard headers will work. Stock intake ans exhaust manifolds are a bolt on for big Indy power. Kit includes: assembled heads, valley plate, intake gaskets, push rods and head bolts.
New Heart Fast Burn Ch
Std. Port
CNC 906 port opening
270cc intake port
75cc chambers
See all our 426 Legend products in our FREE 20 page parts newspaper
426 LEGEND ENGINES AND CYLINDER HEADS
572" Super Street
770 HP
700 Torque
Mod- Man intake
$16,995
MADE IN USA
426 Hemi 2 x 4 Carb
515 HP
500 Torque
4.25"bore
3.750" stroke
$15,995
426 Hemi Cross Ram
545 HP
500 Torque
4.25" bore
3.750" stroke
$20,245
572" Race Legend
$23,700
960 HP
760 Torque
4.500" bore
4.500" stroke
526 Street Legend
Supercharged
950 HP
900 Torque
4.500" bore
4.150" stroke
$22,995
426-1 Legend Kit
Head assembly, shaft clamp kit, rocker side shims, manifold bolt kit, spark plug tubes, valve covers and bolts, rocker side springs, push rod kit, 426-2 or 3 manifold, Indy roller rocker arms, removable valley plate, shaft oil restrictors,head studs, thick wall rocker shafts, tube O rings, complete gasket set.
On Sale... $6,675
426-SRK Legend Kit
Includes assembled heads with:
2.25 x 1.94 200cc port
Indy roller rocker arms
Rocker side shims and springs
Head studs and manifold bolt kit
Spark plug tubes and O-rings
Chrome valve covers
Mod-Man choice of tops
1x4, 2x4, 3x2 blower top
Push rod kit and complete gasket set
On Sale... $5,499
Arlen Vanke 426 Hemi
Dominator dual plane intake
Low profile for hood clearance
820 HP
On 572" Super Street
$595.00
See all our 426 small block products in our FREE 20 page parts newspaper
360 LA & MAGNUM ENGINES AND CYLINDER HEADS
360" Magnum
MA-X Cast Iron Heads
380 HP
415 Torque
4.020" bore
3.580" stroke
$4,995
MADE IN USA
408" Magnum
MA-X Cast Iron Heads
$6,749
460 HP
480 Torque
4.020" bore
4.000" stroke
408" Small Block
Supercharged
725 HP
4.030" bore
4.000" stroke
$13,900
415" Magnum
MA- X Cast Iron Heads
$7,695
520 HP
500 Torque
4.060" bore
4.000" stroke
440" Magnum
MA-X Cast Iron Heads
600 HP
550 Torque
4.185" bore
4.000" stroke
R3 block
$10,850
Rectangle Port (360-1) Or Oval Port(360-2) Head Kits
Kits include heads assembled with 360-4 rocker assembly 1.5 or 1.6, 360-9K push rod kit, 360-14 rocker shafts, 360-11 rocker studs, 360-3 intake, 360-16 head bolts, head gaskets, intake and exhaust gaskets.
On Sale $3,535
360-1 Rectangle Or Oval Port
Indy Aluminum W-2 Head
Intake port 210cc
Exhaust port volume 85cc
63cc combustion chamber
Stock valve location
Both 360 and W-2 exhaust pattern
$1,785
Bare
Indy LA-X
Cast Iron Head
Combustion chamber volume 62cc
Intale port volume 179cc
$1,050 assembled
Indy MA-X
Cast Iron Head
Stock / W-2 exhaust
Std 1.920 x 1.625"
5/16 stem valves
$1,050 assembled

24 QUESTIONS WITH CHRIS COWLAND

WE DIVE INTO THE DEEPEST SECRETS OF DODGE'S HELLCAT ENGINE WITH THE MAN WHO CREATED IT.

Chris Cowland, Chrysler's Director of Advanced and SRT Powertrain, is the man charged with bringing the 707hp Hellcat engine to life for Dodge. And while there were certainly other talented engineers at Dodge who brought their significant talents to bear on engineering the supercharged 6.2L wonder mill, it was Cowland who oversaw the grand plan and made the key design decisions. As the hot rodding public will soon find out, Chrysler's move to put Cowland in charge was a wise one.

But first, some background on the man. Cowland has been a fixture in the automotive industry for 30 years—the last six at Chrysler. He was initially brought in as chief engineer and program director of the Pentastar engine program (Chrysler's line of aluminum 3.0, 3.2, and 3.6L V-6 engines with variable valve timing and cylinder deactivation), then he took over in his current role as director for Advanced and SRT Powertrain.

The mastermind behind the Hellcat is a Brit, and he hails from Peterborough, a town just 75 miles north of London, England. Cowland got his Masters Degree in Automotive Engineering from the prestigious Cranfield Institute of Technology, and began working near his hometown at Perkins Engines, which makes industrial, agricultural, commercial, marine, and diesel engines. After 13 years at Perkins, he went to Lotus Engineering, where among other things he was the designer and CAE engineer for a high-volume Opel powertrain.

Then in 1995, Cowland made the life-altering move to the United States to work with two big automotive consultancies. First, he became technical director at Ricardo—an outfit which develops low-volume high-performance niche engines including the redesigned 8.4L Viper engine. He then moved on to AVL, the world's largest independent powertrain development company, which has its U.S. offices based in Plymouth, Michigan. At both of these companies, Cowland consulted on Formula One engines, European and American touring car and race engines, even tractor pulling engines. Says Cowland of his extensive career: "It's been a real variety, with everything from a weed wacker engine right up to a super tanker engine. So 70 percent of my history is with automotive, and the other 30 percent is with some really unusual forms of internal combustion engines." *—Johnny Hunkins*

MOPAR MUSCLE MAGAZINE:
Seven hundred and seven horsepower is a huge benchmark. What sort of challenges did you face engineering and otherwise?

CHRIS COWLAND:
Obviously 707 is a big number, and it's a big number especially when you consider that this is a fully validated, street-legal, emission-legal production car. We're basically getting an engine to be able to develop that level of power but also meet all of our internal Chrysler durability and reliability levels, to parse all of the emissions and OBD legislation that we have, and to deliver fuel economy that is responsible within the CAFE environment. You really put all those challenges together, and 707 is a big number.

***MM*:**
Can you speak to the challenges that you faced in the engineering of this Hellcat engine?

CC:
The biggest challenges we really face relative to the high power output that we generate are all thermo-mechanical loading of components so we obviously generate very, very high mechanical loads and also very, very high

thermal loads. And just to give you an idea of maybe some of those types of mechanical loading, we've got a very large-bore engine—a 103.9mm bore—and when we look at cylinder pressures in the range of 110 bar, every time we fire a spark plug, we see about 21,000 pounds of load on every single piston, every single time we fire a spark plug at rated power.

Just to put that in context, if you imagine five Challengers standing on the top of every piston every time we fire it, that's the sort of mechanical load that the structure needs to be capable of withstanding, so forged pistons, forged connecting rods, diamond-like carbon coatings on the piston pins, super finished bearing surfaces with induction hardening. You can imagine that those loads basically transmit from the combustion chamber right away through the crank train and then coming out the back of the engine into the transmission.

From a mechanical loading perspective, we have very, very high loads. From a thermal perspective, obviously we've got a very large supercharger. We're driving that supercharger at anything up to 14,600 rpm and using just over 11 psi of boost.

In order to contain the thermal loading that that creates, we have two intercoolers within the supercharger that are on a specially developed low-temperature cooling loop. That low-temperature cooling loop, instead of running water at 90 degrees centigrade, which is typical for the engine coolant, we run that coolant loop down at 40 degrees centigrade, so that allows us to suck as much heat as we can out of the inlet charge from the supercharger before it goes into the engine.

MM:
Chrysler was the last of the Big Three to exploit a blower on a V-8 platform. Clearly it helped to be the last. Were there any lessons learned there by waiting?

CC:
I think we obviously benchmark competitors' engines. We look at how they've achieved some of their performance levels. We've gone maybe with a nontraditional supplier of superchargers from the Big Three perspective. We did a lot of work at looking at who we thought was going to supply the best supercharger solution for our particular application. We went through running a number of the competitive products in order to define that.

From being last to the trough, I'm not sure if it made a huge amount of difference to us. There is a lot of simulation that goes into designing these engines. We tend not to use sort of empirical rules. We go down to raw simulation and do all the combustion simulation and CFD (computational flow dynamics –*Ed*.) simulation so all the design and optimization is based around emulation and development work off of this particular product.

MM:
The Hellcat is 91 percent new compared to the current 5.7 and 6.4L Hemi. Can you elaborate?

CC:
Sure. The 91 percent comparison that we've quoted is a Hellcat versus an Apache, so Apache is the 6.4L SRT product that also appears in some of the Dodge products now, so the 475hp engine has been in production for a while. Ninety-one percent refers to the dollar value of the new engine. We don't typically quote a part count difference because, obviously, when you look at the part count in an engine, we have a lot of what I'll call low-value multiple parts, so we have lots of fasteners, lots of clips, lots of small pieces. We don't typically quote the number of parts that are different, we quote the value of the parts, so the 91 percent is if you look at how much it costs us to build a Hellcat engine; 91 percent of that content is not used in the 6.4 Apache.

MM:
Ten years ago building an engine with a 9.5:1 compression ratio and almost 12 pounds of boost would have been a disaster. What has changed in the technology to make that viable?

CC:
Good question. We used a huge amount of combustion simulation work to understand how to make the engine avoid detonation or knocking. There's a lot of work that's gone into it from a combustion side of things; making sure that we've got air and fuel right. Then there's also a lot of work on the thermal side of things, where we have to make sure that we don't create any hot spots in the combustion chamber on the piston. We have piston cooling jets, oil cooling jets on the bottom of the pistons, which really improve the heat transfer. As I said before we used this low-temperature cooling loop, which drastically dropped the charge temperatures that we're seeing into the engine.

We really attack it on two fronts; we make sure that we cool all the critical parts in the engine well and we make sure that the whole combustion process works extremely efficiently. As you say, if you just try to do that on an engine—try to boost to our levels on an engine from 10 years ago—it would not be a very good result, but with all of these efforts we put in, that's how we can get it to work.

MM:
The heart of any high-powered engine is the cylinder heads. What have you done there?

CC:
Obviously, there's cylinder head adaptations required for the supercharger application, but ultimately one of the biggest changes that we've made in line with avoiding knock on the engine—being able to withstand the very high thermo-mechanical loads—is the cylinder head material. It has been changed to a different alloy that has a lot higher high-temperature strength, fatigue strength, but it also brings in much better thermal conductivity. Those design changes enable us to create those conditions that we can avoid knock, and we can also withstand the high firing pressures and the high thermal loads. The Hemi architecture, with the traditional Hemi included valve angles and locations and basic combustion chamber shape, is retained. It's still based on Hemi architecture.

MM:
Without going into the speculative side of things, would you happen to know whether it will bolt on to the 6.4L block?

CC:
I've never looked, but the bolt locations have not been moved. I would say that I'll add one thing: The block water jacket has also been modified in order to create these thermal conditions that we want from a liner, a bore cooling perspective, so the water jacket in the Hellcat cylinder block is not the same as the 6.4L block.

MM:
Gearheads will appreciate the robustness of the Hellcat's forged pistons. Most manufacturers steer clear of forgings. Obviously, they have their advantages. Without really speaking to the how and why other manufacturers do what they do, can you explain what made the decision for you easier to go with a forged piston, because we all know that the cost is a lot higher?

CC:
Yeah, I mean the cost is much higher but it all comes back to the same points, high thermal loading on the pistons, high mechanical loading on the pistons, the durability cycles that we required for this engine to pass, the

"The Hemi architecture, with the traditional Hemi included valve angles and locations and basic combustion chamber shape, is retained." –Chris Cowland

forged pistons were the robust solution that we selected right from day one. We did not try and develop a cast-piston solution. We made that decision on day one that we were going to go with forged pistons. We got experience at forged pistons on the Viper engine. As you know, the original Viper had forged pistons. We went away from forged pistons, and then in '13, we've gone back to forged pistons in Viper, so we made that decision on Hellcat early on.

MM:

How would you lay out the advantages and disadvantages of a forged versus hypereutectic piston? A lot of manufacturers go with the cast pistons, not just for the price, but for expansion stability, emissions, blow-by, or cold-start. Did you have any issues there and if so, how did you overcome that?

CC:

Yeah, you're quite right. The expansion characteristics of the forged piston are typically different to a cast piston. With fuel economy being the ultimate driver for the majority of engines in production today, the cast piston typically offers slightly improved friction characteristics because of that more controllable expansion.

The forged piston is usually slightly worse from a friction perspective, and we found that in a number of our engine developments where we've run back-to-back forged and cast. The huge rating we were looking for, the huge loading we were looking for, the amounts of friction difference between forged and cast on an engine such as the Hellcat when we've got a very substantial supercharger involved in the equation and these very high loads, that friction difference wasn't enough to make us interested in trying to do a cast piston.

MM:

The Hellcat's block must be incredibly strong to handle the power. What are the highlights of that block?

CC:

The biggest difference on the block is the cooling strategy around the top of the cylinder bores, between the bores. The 6.4L Apache block is a very, very strong block to start with, but when we look at the thermal conditions that we create from Hellcat there are some areas that we would exceed acceptable fatigue stresses in. But also there are some areas where we get to high bore temperatures, which cause oil lacquering problems. By far, the biggest change in the cylinder block is the improvement in the top of the cylinder-bore cooling.

MM:

Let's go back into your mind, back in time. You're developing this engine. The design goals have been set, and the problems are coming at you as to be expected. What was the biggest "aha moment" when you knew you had it covered? What was the problem and what was that solution?

CC:

I think one of the biggest ones for me was this whole low-temperature cooling circuit. This cooling circuit had been developed as part of my advance team—not the SRT group—the advanced team for another engine program where we're looking at the ultimate fuel economy. The idea of it came from that fuel economy engine. Obviously, that engine does not run anything like the sort of thermal loading of this one. It was the application of that low-temp cooling circuit onto the Hellcat where we struggled with being able to reject enough heat. Not from an engine perspective, but from the airflow through the vehicle. We obviously have to create a condition where we get lots of airflow over these heat exchangers, but we also can't upset the aerodynamics of the car because a 200-mph car has to have extremely good drag and lift characteristics. We spend quite a lot of time on some circuits—high-temperature circuits, high-speed circuits—in making sure we could cool the engine on the low-temperature loop as we had been in the initial dynos. Obviously, on the dyno we can dial in any temperatures that we want, and when we got onto the track and we started working through that, we sorted out the air flow through the front of the car and basically that was the "okay now we know that we can deliver the performance we want in the vehicle."

MM:

Most of our readers are familiar with intercooled supercharger systems and air-to-water intercooler systems. When you talk about a low-temperature cooling loop versus a high-temperature cooling loop, are you referring to standard air-to-water intercooler systems when you talk about high-temperature cooling loops? In your low-temperature cooling loop, what kind of temperatures are we talking about?

CC:

On a traditionally intercooled supercharged engine—you're running air-to-water—we would be using the coolant from the engine that also cools the engine on one side of the heat exchangers and then obviously the air from the supercharger on the other.

We will be using about 90 degrees centigrade, which is about 200 Fahrenheit, roughly. 200 Fahrenheit water or ethylene-glycol mix. We get a Delta T between that 200 Fahrenheit and whatever the boost temperature is coming out of the supercharger.

On our system we have, we have two totally separate water circuits in the vehicle. The cooling for the engine runs at this 90-degree centigrade, 200-ish Fahrenheit. Then we have a totally separate one with a separate pump, the fluids don't mix at all, and we run that system at 40 degrees centigrade, so something like, I'm guessing, 104 Fahrenheit maybe something like that.

Effectively what we've done is we've now increased the heat-rejection capability of those intercoolers because we've got colder fluid on one side which means that we can drag the boost temperatures down even lower. As I said before, the reason for wanting to drag those boost temps lower, first of all, it's volumetric efficiency. The colder we can make the air, the more we can get in. I'm sure your readers are very, very used to that.

Secondly, it's about the knock performance of the engine. The colder we can make the incoming charge, the more spark advance we can put in the engine, all the more compression ratio we can put in the engine, or both. Therefore we get more power.

There is no way we could generate the power output that we're doing if we had the superchargers hooked up to only the high-temperature loop. We would be significantly down on power because the engine would knock, and we'd have to retard the spark. We'd also lose volumetric efficiency.

MM:

Could you put a number on that? What's that worth? A hundred horsepower?

CC:

It could ... I haven't analyzed what we would lose, but I could well believe it could be 100 hp, yes.

MM:

How do you test an engine like the Hellcat? It's a very powerful engine, and I can't imagine there's a lot of dynamometers and machinery around that could handle that.

CC:

Yep, and in fact, when we started this program, we had to limit the power output of the Hellcat engine to 620 hp, because we didn't have any dyno cells that were capable. But it wasn't just the dyno absorption capability. Obviously, there's a huge amount of airflow and cooling air required through the dyno cell, and we just didn't have a facility that could handle that. So we actually had

a number of test cells upgraded during the program to allow us to be able to run the full power output for that.

So that included the fuel delivery systems in the test cell, the air delivery systems, the cooling systems, and the dynos themselves. How do we test it? We actually developed some very, very special validation tests for the Hellcat. The tests involved recognizing that this car is going to be used on the dragstrip, it's going to be used on the track, and it's going to be used on the road, and one of the unusual things about SRT is that we don't run away from warranty if the car has been used on the track. It's a car that we expect to be used on the track and we develop our cars to be fully capable on the track. So the new validation test that we have is actually a composition of a number of full drag cycles where we will run the engine in a transient nature running from low speed up to wide-open throttle, full power, and that gets repeated a number of times to simulate a number of drag stops.

We have a portion where we're running peak torque, and we have a portion when we're running peak power as well, and that cycle is repeated and repeated and repeated as one of our validation tests. We also do all of the typical peak thermal shock cycle testing which is one of the nastiest tests that we have. That's a head gasket test. Basically it's the sealing test where we run the engine up to maximum coolant temperature and then evacuate all of the water out of the engine, flush it back with minus-20 centigrade water, so we basically make the whole engine contract, cool it down as fast as we can, and then we do the whole thing again.

So we run the engine flat out, get it as hot as it can, and that cycle repeats and repeats and repeats. It's a horrible test. You actually go in the test cell and the engine gets covered in frost. The engine will be covered in … basically it just turns white. But you can also hear all of the metal expansion and contraction as the engine's cooling down and heating up. So you hear the catalyst pinging—you know when you turn your car off and you hear the ticking of the catalyst?—imagine the base engine doing all of that moaning and groaning and ticking, so it's a really, really severe test.

MM:
Where was most of the work on Hellcat done?

CC:
Ninety-nine percent of the work was done internally within the SRT Powertrain team. There were a couple of very special tests that were done externally, some supercharger noise testing, some things like radioactive oil consumption testing that we do not typically do internally, but the team that designed it and developed it were all at Chrysler and it was done internally.

MM:
Tell us about the supercharger, because this is no ordinary bolt-on–style blower.

CC:
No, the supercharger is custom-designed in conjunction with the supplier IHI. [IHI is the supercharger supplier for Mercedes' AMG division. *–Ed*.] We worked very closely with IHI to come up with the overall system that we required, and that included this low-temperature loop on the intercoolers, and included getting very, very good airflow through the intake ports. As you know the base Hemi architecture flows extremely well with the way we've got the valve angle set, and we wanted to make sure that we didn't cause any restrictions within that intake flow. A lot of CFD work on internal flows and making sure that we've got distribution from the screws, through the intercoolers and into all the eight individual cylinders trying to even those up as much as possible. It was a joint effort between the Chrysler and IHI team.

MM:
Now when you say intercoolers in the system, are you referring to there being a heat exchanger on the hot side and one on the cold side, or are there multiple intercoolers on either side?

CC:
There are two heat exchangers inside the supercharger, one for each bank. We come out of the rotors through a heat exchanger—from an air perspective—then into the intake ports. Those heat exchangers—or intercoolers if you want to call them intercoolers—are hooked up with this cold water—this 40-degree centigrade water—which runs through those two coolers.

MM:
Are they in series or are they in parallel?

CC:
They are in parallel. They are a left bank and a right bank. They are totally separated from the engine perspective. Left bank and right bank.

> ***"...one of the unusual things about SRT is that we don't run away from warranty if the car has been used on the track." –Chris Cowland***

MM:
What's the deal with this one-way sprag on the snout? What does it do?

CC:
The supercharger is 2.4 liters in displacement. It has relatively large rotors, and even though they're made out of aluminum, they've got quite a significant inertia. When the engine is accelerating the supercharger through the belt system, no problem; we're driving in the correct direction for a belt and the tension around the belt. When we take our foot off the throttle in the car, the engine wants to slow down, but because of the inertia of the supercharger, the supercharger wants to keep going. The supercharger starts trying to drive the engine.

Because of the way the tension is working in a beltdrive system, that potentially is a challenge for belt dynamics on the supercharger. It also loads the gears differently within the supercharger. What the one-way clutch does is it will only allow torque to be transmitted from and to the supercharger in one direction—the direction that we want to drive it. It will effectively freewheel when the supercharger is trying to drive the engine, so no loads go into the drive belt under those conditions.

MM:
Are there any more oats in the feed bag? Can guys turn up the wick with a smaller pulley?

CC:
[laughs] I am sure that the tuning community will go to work on a Hellcat as soon as they can get their hands on one. There are, obviously, various things that are done to increase the performance of engines. We'll see how ingenious some of the solutions are in trying to increase the power output.

MM:
Other manufacturers have had challenges in designing the lube system to manage oil drain back, aeration in the oil, and g-forces. How have you overcome that in Hellcat without resorting to a dry sump system?

CC:
The oil pump is an increased displacement pump versus the 6.4-liter; because of the cooling jets, because of some of the bearing requirements, it's increased. Basically the wet sump has revised baffling within it. We have our typical SRT development tests relative to track testing, figure of eight, circle testing—which also includes running them on slicks so that we can generate even higher g-loading. We have some limits developed from an oil aeration perspective and a temperature change perspective, so it's a challenge, but it can be done with a wet sump system.

MM:
At what power level did you deem the piston oil squirters necessary? They seem like a nice measure of protection.

CC:
We actually run piston cooling jets and squirters on the [6.4L] Apache engine today, so even at 475-485 hp, admittedly with cast pistons, we run oil squirters, but the way we developed pistons, we basically have finite element analysis which comes up with some expected piston temperatures, which we look at compared to the alloy of the material that we're using, but then we also do something called piston telemetry measurements where in order to confirm those temperatures, we bolt a little transmitter to the bottom of a piston, and we hook that transmitter up to a bunch of thermocouples in the piston. We run the engine, and we basically beam the data from the transmitter to a receiver so we can see exactly what those piston temperatures are doing in the engine.

We knew this was above a typical threshold from how many horsepower per square inch or kilowatts per square centimeter that you would typically need oil piston cooling for, but the way that we confirm that we were getting to the right temperatures in the pistons was both by finite element analysis and then confirmation with this piston telemetry work.

MM:
Did your design team look at direct injection at any point, and, if so, why did you decide against it?

CC:
We've looked at direct injection for a while on the Hemi architecture. The whole Hemi architecture and the way that we have the valvetrain laid out is very, very good from a flow and a knock perspective. On a direct-injection engine you really want something that's more symmetric in the opposite plain to what we have. Hemi architecture doesn't really lend itself to direct injection. When you look at the benefits of direct injection, we believe that the additional airflow and therefore volumetric efficiency that we get on a high-performance engine from having that valve arrangement versus the volumetric efficiency benefit that you would see from direct injection, there isn't a difference between those two.

> "I am sure that the tuning community will go to work on a Hellcat as soon as they can get their hands on one." —Chris Cowland

MM:
This last question relates to the exhaust valve bypass in the exhaust system. When you engineered that part, was the point of it for horsepower or was it for sound or for both?

CC:
It was mainly for sound. Obviously we have a challenge to make pass-by legislation but also provide the sound of the vehicle that we want it to. I honestly don't know the number. It does help performance-wise. But I honestly don't know the number that if you leave the valve shut how much power you lose. But a lot of it was about trying to generate the character of the car that we were looking for. **MM**

Dante's
mopar parts
MOPAR
AMC
LET US HELP WITH YOUR NEXT PROJECT
CARPET
SEAT COVERS
HEADLINERS
FLOOR MATS
DOOR PANELS
CONVERTIBLE TOPS / BOOTS
INTERIOR KITS
EXTERIOR SHEET METAL
FUEL TANKS
WEATHER STRIPPING
INTERIOR KITS
Starting From $725
Including Carpet, Seat Covers
& Headliner
FUEL TANK KITS
Starting from $350
AND MUCH, MUCH MORE
TO CHOOSE FROM!
FOR OUR FULL INVENTORY SEE OUR WEBSITE:
www.dantesparts.com
sales@dantesparts.com
609-332-4194
FAX 856-417-3799
Mullica Hill, NJ 08062
VISA
MasterCard
WE SHIP WORLD WIDE!
HOURS-EST: MON-THURS 8AM-6PM • FRI 8 AM-5PM • SAT & SUN CLOSED

TEXT AND PHOTOS: DAN FOLEY

SLICK-BUILT SMALL-BLOCK

HERE'S HOW TO BUILD A STRONG-RUNNING, DURABLE, PUMP-GAS LA-BASED STROKER.

PART 1

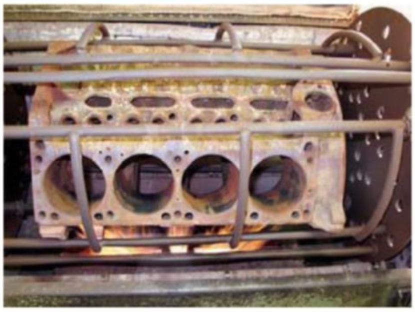
Once upon a time, we dropped a budget-built 360 in a '74 Challenger and ran 12s on the cheap, but that was over 15 years ago when a 12-second e.t. was quick and respectable. Times have changed. Your ride needs over 500 hp and better run 11s or faster to be competitive with today's classic and/or modern muscle cars. Nowadays, if you want a small-block that's a strong street driver, a stroker is the way to go. Most know that a stroker engine will deliver additional bottom and mid-range torque, making street driving a more pleasurable experience.

The stroked 340 small-block that's the subject of this story will be implanted into the Slick Challenger you've been following the last few issues. We've refinished its tail end ("Getting Some Tail," June '14), installed a new fuel system ("Slick, Stealth Fuel System," September '14), refreshed its mice-infested interior ("Clean, Quiet and Cool," Oc. '14) and upgraded/replaced the clutch and transmission linkage components ("Clutch and Trans Connection," Dec. '14). If you missed those stories, our project car is a '73 Challenger Rallye 340 with factory air conditioning and the gear-grabbin' Pistol Grip four-speed. The plan back in '99 was to build a 360 to replace the original 340, which had spun a rod bearing and wiped out the cam/lifters back in '88. Plans changed and were put off a few times. Unfortunately, the previous owner, Slick, died in 2008.

"Times have changed. Your ride needs over 500 horsepower and better run 11s or faster to be competitive with today's classic…"

We picked up a standard bore 340 over 10 years ago for a '73 Challenger Rallye 340 project, which had belonged to a good friend who's since passed away. The clean E-Body was sitting in his home garage wounded with a spun rod bearing and wiped cam lobes for over 25 years. My goal was to bring it back to life.

The Scat Crankshafts 340/416 rotating assembly (PN 1-48013BI) was a sight for sore eyes! All the rotating/reciprocating parts (forged 4340 steel crank with a 4.000-inch stroke, 4340 I-beam rods, forged aluminum pistons, chrome-moly rings, main and rod bearings) are fully inspected to ensure quality and balanced in-house by Scat. This high-quality rotating assembly is rated for up to 800 hp. Another stroker kit we considered from Scat for the 340 is a 372ci rotating assembly using a 3.580-inch stroke crank, but we wanted maximum cubes.



We brought the 340 block to IDM Speed and Machine in Stafford Township, New Jersey (609-978-6411). Our LA block went through three Amp Pro machines for a thorough cleaning before Magnaflux and machine work. First, it is baked in the Amp Pro oven on a rotisserie that burns off dirt, oil, sludge, paint, and more. Next, the block was placed (while bolted to the same rotisserie) into the second Amp Pro machine. While rotating inside this machine, stainless wire media is blasted inside and out to fully clean the block. For the third step, the block is rotated and shaken side to side to shake out any rust particles or stainless media.

At IDM, each cylinder received a .025-inch overbore on a Rottler boring machine. This machine self-centers each cylinder before cutting for a rough bore that is perfectly round and straight.

After boring, the cylinder wall thickness was sonic checked on the major and minor side and throughout each cylinder. The Chrysler LA motor is a thin-wall casting that must be checked before any type of performance buildup. Be sure there is at least .175-inch thickness between the bore and water jacket. Fortunately, our '72-casting 340 showed over .200 inch, and as much as .250 inch, in all of its cylinders, giving us the green light to move on.

The Scat rotating assembly features Icon forged aluminum flat-top pistons (PN KB744+.070, for a 4.070-inch bore) with full floating pins and spiral locks. The deep valve reliefs will provide plenty of piston-to-valve clearance for the .600-inch-plus lift COMP Xtreme Energy solid street roller cam we'll be using. These pistons are rated to provide 11.2:1 compression with a 68cc combustion chamber, and 10.8:1 compression with a 70cc chamber. They are lighter and stronger than stock, which will help the engine rev quickly.

This resurrection/buildup of the Slick Challenger will be dedicated to the memory of its late owner, and instead of a 360, we're building a 416-inch stroker based off a 340 block.

In this first installment, we'll feature the important details of cleaning, precision machine work, prep, and re-cleaning that is of the utmost importance before assembly of a short-block. Also of importance for a long-lasting engine is the choice of strong, durable, quality components for the rotating/reciprocating assembly, valvetrain, and oiling system. For the high-quality engine parts we needed for this type of engine build, we put in a call to Scat, COMP Cams, and Milodon. Follow along and see the precision blueprinting machine work our friends at IDM Speed and Machine helped us put into this stroker small-block. MM

WHAT TO GET!

DESCRIPTION:	PN:	COST:
SCAT 340/416 ROTATING ASSEMBLY	1-48013BI	$1,842.97
COMP CAMS XTREME SOLID-ROLLER CAM KIT	CL20-740-9	$719.97
COMP CAMS HI-TECH TIMING SET	3103	$64.97
MILODON MAIN STUDS	81186	$96.97
MILODON HEAD STUDS	80236	$129.97
COMETIC MLS HEAD GASKETS (4.125-INCH BORE)	C5457-040	$103.17
EASTWOOD CERAMIC ENGINE PAINT, 1 QUART	51619ZP	$34.99
EASTWOOD URETHANE ACTIVATOR	21854Z	$14.99
CLEAN BLOCK (AMP PRO THREE-STEP)	N/A	$80.00
MAGNAFLUX BLOCK	N/A	$55.00
SONIC TEST BLOCK	N/A	$80.00
CYLINDER BORING & HONING (TORQUE PLATE)	N/A	$240.00
ALIGN HONING MAINS	N/A	$150.00
SQUARE DECK BLOCK	N/A	$120.00
INSTALL CAM BEARINGS	N/A	$30.00
INSTALL FREEZE AND GALLEY PLUGS	N/A	$20.00
ASSEMBLE SHORT-BLOCK	N/A	$250.00
DEGREE CAMSHAFT	N/A	$60.00

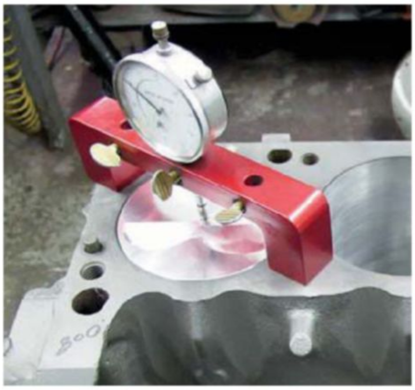
Another essential part of the rotating assembly is Scat's forged 4340 I-beam connecting rods (PN 2-ICR6123-2124). These heavy-duty rods include rugged ARP bolts, plus they are designed to provide sufficient rod-to-block stroker clearance. They're made to handle up to 800 hp.

These high-quality components are also included and finish off the Scat rotating assembly: Total Seal file-fit rings (PN ST4070-5), Clevite rod bearings (PN MS-540H), and Clevite main bearings (PN CB-481HN).

Each main journal cap was cut precisely to be perfectly flat on a Sunnen cap-grinder machine. Most production caps will show to be on a 1- to 5-degree tilt. When a main cap has a slight tilt, there will not be even clearance across the bearing or an even torque load at the fastener.

Each perfectly flat main cap is torqued to spec, then measured. Each cap is remeasured many times during the line honing process until each cap measures precisely the same. Notice the Milodon main studs (PN 81186). These studs will add that extra measure of strength holding the mains and crankshaft in place.

Next, we placed the Scat 4.000-inch stroke 4340 forged crank (PN 4-340-4000-6123) in the block. Connecting rod-to-block clearance was plentiful at .080 to .100 inch (.060 inch minimum). The crankshaft counterweights showed sufficient clearance at .040 to .060 inch (.040 inch minimum). Scat has strived to offer a stroker kit that will not need any clearance grinding to the block. It's still a good idea to check stroker clearance, as block castings can differ.



Next, we checked the piston-to-deck height at each corner of the block. The left deck checked in at .012 inch, front; and .015 inch, rear. The right deck was .008 inch, front; and .004 inch, rear. Most production blocks do not have square decks and will require machining to be level.

On IDM's large Kwik Way surface machine, our block was square-decked so there would be a .003-inch piston-to-deck height at each corner and across the deck. Shop owner and master machinist Ed Hickey performed this task and used CBN-type cutters for an ideal deck surface for the Cometic MLS head gaskets we'll be using.

IDM then honed the final .005 inch on a Sunnen CV-616 Cylinder King for the .030-inch overbore. Cylinder honing with deck plates simulates the head being torqued in place for perfectly round cylinder bores. Milodon studs (part No. 80236) were used to secure the torque plate and will provide the same torque load to the block and heads when the engine is assembled.

Eastwood's Ceramic Hi-Temp Engine Paint (Chrysler Blue, PN 777 51619 ZP) is said to withstand temps up to 650 degrees. It's more heat-, chemical-, and chip-resistant than any spray can engine paint. It can be brushed or sprayed on but needs to be mixed with its activator first (PN 21854Z).

"The stroked 340 small-block that's the subject of this story will be implanted into the Slick Challenger you've been following…"

We then installed new PTFE-coated cam bearings from Dura-Bond (PN PDP-16T), then the Scat crank, timing set (COMP Hi-Tech, PN 3103), and cam (a COMP Xtreme Energy solid-roller and lifter kit, 248/254 degrees duration and .616-/.622-inch lift with 1.6 rockers, PN CL20-740-9). These were final installed only after checking the rod and main clearances. The cam card specified an installed centerline of 106 degrees for 4 degrees of advance. We elected, however, to leave our cam at its dot-to-dot installed centerline of 108 degrees, for 2 degrees of advance over spec.

Here's our assembled short-block awaiting its Milodon Road Race oil pan, Edelbrock RPM aluminum heads, and RPM Air-Gap intake. These components will make a nice combination for a strong-running, pump-gas small-block. Next time we'll finish up with the long-block.

SOURCES

COMETIC GASKET
800-752-9850
WWW.COMETIC.COM

COMP CAMS
800-999-0853
WWW.COMPCAMS.COM

EASTWOOD
800-345-1178
WWW.EASTWOOD.COM

IDM SPEED AND MACHINE
609-978-6411

SCAT CRANKSHAFTS
310-370-5501
WWW.SCATCRANKSHAFTS.COM

Learning to TIG weld aluminum is a lot more tempting when it comes in the form of a multi-role machine like the Miller Electric Syncrowave 210. This baby can TIG and stick weld, and even upgrades to a spool gun for MIG welding aluminum, mild steel, and stainless steel. Entry price on the Syncrowave 210 is $2,678.

TEXT AND PHOTOS: JOHNNY HUNKINS

TIG, YA DIG?

AN EXPERT AT MILLER ELECTRIC SHOWS HOW TO TIG WELD CAST ALUMINUM WITH THEIR ULTRA EASY MULTIPURPOSE SYNCROWAVE 210.

TIG welding isn't rocket science, it's actually closer to metallurgy. We get it. Most hobbyists are at the limit of their comfort zone with MIG welding, and mostly in non-critical areas at that. Our goal with this story is to let you in on a little secret: TIG welding is not only very rewarding when you get it right, it's been made a ton easier by Miller Electric with their new Syncrowave 210 machine. More about that in a minute.

When most folks think about welding, they think about MIG—metal inert gas. This relatively simple process uses the workpiece as one electrode and the filler material—fed by a gun—as the opposite electrode. When the arc forms, the electrode melts and becomes part of the weld. The electrode is sacrificial, and because the process is so simple, most people can get the hang of it quickly. Oh, and the integrity of the weld is dependent on an inert shielding gas—a mix of argon and carbon dioxide. This gas displaces the oxygen and nitrogen found in the atmosphere, and shields the weld from interacting chemically with the atmosphere. This eliminates or reduces oxidation and embrittlement throughout the weld, making it strong and durable.

TIG, an acronym for tungsten inert gas, is also called gas tungsten arc welding (GTAW). In this somewhat different process, a plasma arc is created whereby the workpiece acts as one electrode, and a non-consumable tungsten probe acts as the other electrode. The filler material is provided as needed by a filler rod of the same or similar material to the workpiece, and is artfully dipped by the operator into the molten puddle created by the plasma arc. The process of regulating the heat and speed of the weld is an acquired skill, and requires some practice to be proficient. The power of the plasma arc and thus the heat (which determines the width and depth) of the weld puddle is determined by the operator via a foot pedal, which varies the amperage of the arc.

Sound complicated? It usually is. That's because there are a lot of variables in TIG welding, like the work material, polarity, amperage, balance, filler material, and your own dexterity. But what if there was a welder that made all the right settings automatically for you, leaving you to practice your TIG technique without worry? What if that welder also did stick welding, and came with an optional spool attachment to MIG weld aluminum, mild steel, and stainless steel? What if you could plug it into either 230 volts or regular 115-volt household power? What if that welder was lighter, physically more robust, and boasted a brick-and-mortar dealer network with over 500 local stores? Yeah, you'd suddenly be giving it some serious thought. In case you're wondering, that welder is Miller Electric's Syncrowave 210 ($2,678, base).

Here, we're only going to be dealing with TIG welding cast aluminum, but the technique is similar for all ferrous and non-ferrous materials. TIG welding is far and above the most versatile form of welding you can do, so it pays to become proficient and to have the right gear. Besides cast aluminum, you can TIG weld a multitude of metals, including stainless steel, billet or extruded aluminum, cast iron, nickel, magnesium, copper, and titanium. And with the right alloy filler, you can even join dissimilar metal types, like cast iron and steel. The news here is that one welder—the Syncrowave 210—can do it all. You will literally only need one tool for all your needs.

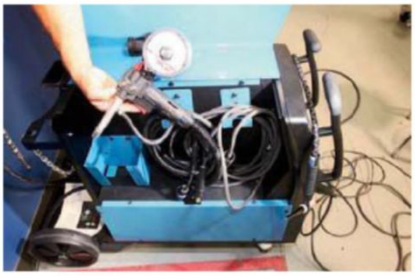
For our story here, we had an unanticipated need to cut and weld the inlet neck to our big-block water pump

"TIG welding is not only very rewarding when you get it right, it's been made a ton easier…"

The 210's power supply is inverter-based, as opposed to a transformer. This enables it to run on either 230 or 115 volts, and it can operate in AC or DC modes for TIG welding. The inverter also allows the user to vary the waveform and phase to vary the balance to optimize cleaning during AC operation. Best of all, inverter power supply technology is lighter in weight, and can handle more physical abuse than a transformer.

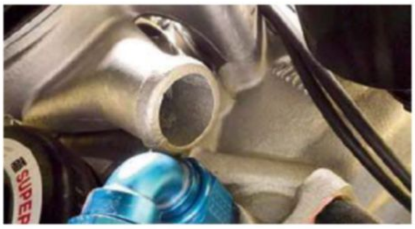
You'd expect a lot more dials, switches, and buttons on a machine that does as much as the 210, but Miller has wisely hidden them in menus opened with the small square button. The main dial selects AC TIG, DC TIG, MIG, and DC stick welding. Within each, the parameters are adjustable, but with a difference: the Pro Set feature calls out recommended settings for simple, novice operation. TIG fans take note: The 210 offers pulsed operation with frequency adjustment. This produces even heat and a beautiful "row of dimes" with very little effort.

housing. There was an interference issue between an oil feed fitting on our Indy Maxx aluminum block, and the cooling hose feeding the inlet side of the water pump housing. We ordered an extra cast-aluminum water pump housing from Bouchillon Performance and took it over to Motech Performance where work is proceeding on our '68 Valiant project car. At Motech, we took a close-up look at the existing entry angle, and calculated that the inlet only needed to be 10 degrees higher to miss the oil fitting on the block. Chris Field of Motech was on hand to help us measure and cut the water pump inlet neck, the idea being to cut it at a slight 5-degree angle, then rotate the end 180 degrees for a total offset of 10 degrees. With the cut cleaned up and the surface prepped for welding, he headed off to Miller Electric's training center in Rancho Cucamonga, California, where Miller's industrial district manager, Josh Sprinkle, guided us through the simple procedure of welding our modded pump housing. **MM**



Underhood, there's plenty of room for accessories, including an optional Spoolmate 100 gun. The Spoolmate can handle either aluminum, stainless, low-carbon steel, or self-shielded flux-core filler for MIG welding, and is almost as simple as using a glue gun. For critical finesse operations like our water pump, however, TIG was our weapon of choice.

Many of Miller's welding machines now come with voltage-sensing technology, allowing Miller welders to be plugged into a variety of power sources. Called MVP (multi-voltage plug), the power plugs can be swapped in seconds to work on either 115V or 230V—a big advantage for the home-based DIY guy.



TIG welding aluminum isn't something we set out to do, but sometimes the need to TIG crops up—you never know until you need it! Here we have an aluminum water pump housing with its inlet facing an AN fitting that's part of the lube circuit on our Indy Maxx block. All we need is 1/8-inch clearance to get the radiator hose on without interfering. TIG welding to the rescue!

We decided to cut the water pump housing inlet neck at a 5-degree angle, then rotate the end so that it aims up 10 more degrees. We didn't want any more angle because we didn't want to affect coolant flow or cause interference on the radiator hose with the power steering pump, which resides just above and to the side of the inlet.

A reciprocal saw on the inlet neck made short work of the cut. We then took the time to dress the cut and clean the area around the planned weld area. Impurities from lubricants, dirt, and coolant can build up on the rough cast surface and cause defects in the weld.

All the action happens from the business end of the TIG torch. The cable carries both the power for the arc, and the shielding gas. In some Miller models, the torch also has a fingertip controller for the amperage that takes the place of the foot pedal. The end has a sharpened tungsten electrode that strikes the arc; it resides in a ceramic shield called a nozzle, which is designed to keep the argon shielding gas around the plasma arc and weld pool.

"...there are a lot of variables in TIG welding, like the work material, polarity, amperage, balance, filler material, and your own dexterity."

"The news here is that one welder—the Syncrowave 210—can do it all. You will literally only need one tool for all your needs."

TIG welding is a choreographed dance among the torch, the filler rod, and the foot pedal. Note that the torch faces in the direction of weld movement to keep the weld enveloped by the shielding gas. The torch can be moved in a slight spiral or a slight zigzag in order to broaden the weld puddle and even out the heat. The filler is dipped into the puddle to add material as needed. Some TIG welds can be done without adding filler—these are called autogenous, and essentially fuse the two halves of the workpiece with the material that's already there.

The real art of TIG welding is adjusting the heat and thus the size of the weld puddle, and that's done with the foot pedal. With the Miller Syncrowave 210, the max amperage is set at the welder and the foot pedal operates within that range. The advantage is that for small, finesse welding you can lower the maximum amperage and the foot pedal will provide more granular control. The weld arc is initiated by the foot pedal, which automatically supplies the nozzle with a flow of shielding gas prior to striking an arc.

After welding, the excess bead was carefully ground down level with a file to examine for porosity. We found surprisingly little. More filler was added to these isolated areas, then the affected areas were "washed in." This is a process where the torch is used to heat the area without adding more filler. The idea behind "washing in" is to more evenly mix the filler material with the native material over a broader area. This reduces porosity further and makes the union stronger.

TIG welding cast aluminum should always be done with pure argon gas, not an argon/CO2 mix, as is common with MIG welding. For welds needing deeper penetration, an argon/helium mix is recommended. Gas flow should be regulated between 16 and 18 cubic feet per hour for aluminum up to half an inch thick. If the weld puddle is disrupted by ambient airflow, flow should be increased to 20 cfh.

The two most commonly used aluminum filler rods are 4043 and 5356. In general, 4043 (and Hobart Filler Metals' new 4943 alloy filler) is more forgiving in terms of weld parameters (shrinkage, cracking, ductility, and flow), it gives better puddle control, and can be used with a wider variety of base alloys. On the other hand, 5356 offers greater tensile strength, but its ease of welding is considered a bit lower than 4043. Due to the porosity of our cast aluminum, we used the 4043 silicon alloy, which is superior at mitigating porosity and oxidation in the affected weld area. Filler rod thickness ranges typically between 1/16 and 3/16 inch in diameter, and comes in 1/32-inch increments.

These before-and-after images show the subtle change in the angle of the water pump inlet nipple. If we want to restore the cast appearance to the weld area, we can hit it with some silicon media in a blast tank. No one will know the difference!

SOURCES

MILLER ELECTRIC
WWW.MILLERWELDS.COM

MOTECH PERFORMANCE
951-813-3550
WWW.MOTECHPERFORMANCE.COM


POWER YOU CAN FEEL
TOYO TIRES
CHALLENGER
SRT
PERFORMANCE
DIAGNOSTICS
OPTIONS
RACING
MONITORING
REC
LOGGING
DCX
inTune
DIABLOSPORT
Trinity.
PART # T1000
('05-'15*)
inTune.
PART # I-1000-DCX
('11-'15*)
PART # I-1000
('05-'10)
ADD 20 HORSEPOWER TO YOUR MOPAR IN MINUTES!
TRINITY TUNER & MONITOR:
• Preloaded performance tunes
• Monitors & logs vehicle functions
• Customizable on-screen gauges
• Checks and clears DTCs
• Programmable LEDs
• Windshield mount included
INTUNE HANDHELD TUNERS:
• Preloaded performance tunes
• Log vehicle functions
• Do it yourself installation
• Color touch screen
• Checks and clears DTCs
• PC and Mac OS X Updates
DIABLOSPORT®
www.diablosport.com/ads/mopar
*Check website for latest release info
561.908.0041
Not legal for sale or use in California on pollution – controlled vehicles.

RESTO CORNER with AMD AUTO METAL DIRECT

TEXT AND PHOTOS: MARK EHLEN

SIDE GLASS REPLACEMENT

HERE'S THE LOWDOWN ON SIDE GLASS, REGULATORS, AND WINDOW ALIGNMENT ON A MOPAR A-BODY.

Funny thing about working on classic muscle cars, it seems the more work you do the more things you notice that could use attention. You paint the car and decide that while you are at it you should probably restore or replace the trim. You rebuild and detail the engine but now you just can't bring yourself to put it back into the unrestored engine bay. You replace the windshield and now the rest of the glass that you used to think looked pretty good appears a little dull.

Well, this is why we have been following owner John Balow's personal '68 Barracuda as it makes its way through Muscle Car Restoration's progressive restoration process, one that allows customers to tackle one bite-sized project at a time and not be overwhelmed with trying to do it all at once. This time we are going to show you how to reinstall and adjust side windows.

Whether you intend to replace your door glass, remove it to polish it, or are just tired of having to wiggle a quarter window to get it to go up and down, we're going to show you how to make everything look and work like new again! *MM*

This is all of the quarter window parts. You'll have a regulator, the rear and front run channels, three rollers (one is bolted to the other side of the frame), and the quarter glass.

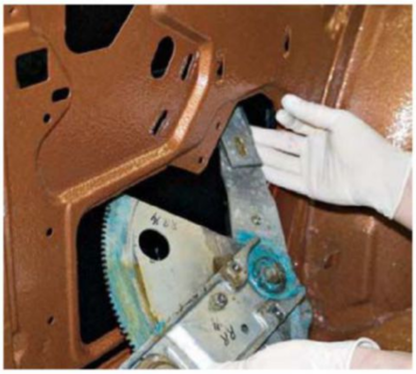
Thoroughly clean and inspect your regulator. If yours has gotten sloppy, find a good used one as they really are not repairable.

Broken guide rollers are not uncommon. New ones are available from YearOne. This one rides in the rear run channel and slot number one.

Do not attempt to remove the glass from its holder. If your glass is bad, you'll be replacing the whole assembly. Pay attention to the numbered slots. You'll be referring back to these as we begin reassembly. (Note: Most of the assembly photos are of the opposite side.)

Use high-temperature wheel bearing grease or white lithium on the roller guides, the channel edges, and the regulator pivot points.

There are two of these roller guides, one floats free in slot number three while the other is bolted to the window holder.



When you are ready to reinstall the quarter window, start by installing the regulator first but don't tighten up the bolts because you will be removing them again in a minute. Next, insert the glass and let it rest on the bottom of the quarter. Put some tape over the sheet metal edges to avoid scratching the window as you lower it in place and watch that you don't scratch the window on the regulator.

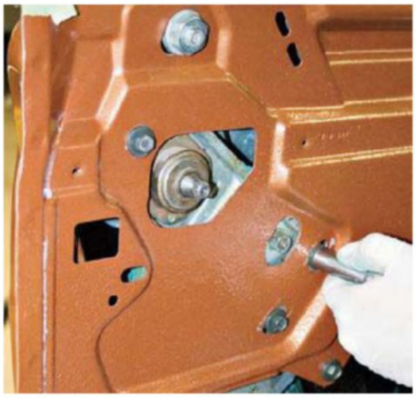
Insert the single roller into slot number one and slide it to the rear. Now unbolt the regulator and move it so you can insert the regulator roller into the same slot. With that done, insert the lower regulator roller into slot number two. Note the fixed guide roller just above this slot. You'll be slipping the forward run channel into it during the next step. Lastly, slide the third regulator roller into the run channel that's welded to the body and rebolt the regulator in place.

The front window channel is next. Slide the roller guide into slot number three and then lower the window. Now take the channel and slide it through the fixed roller guide and into the one you just placed in slot number three. There is a tab in the channel between the rollers—it will later bolt to a slot on a bracket that will allow the bottom of the window to be moved side to side.

The stud at the top of the track goes into this slotted hole. You'll use the small nut and stud to move the channel in or out to adjust the front of the window.

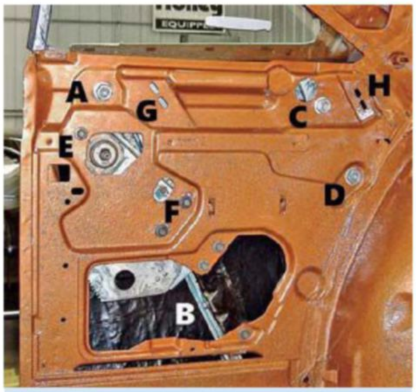
The rear window channel is next. You'll need to roll the window up until you can see the single roller in this hole. Slide the channel over the roller and line up the two adjusting studs; spin on their nuts and tighten in place. These studs are for the side-to-side adjustment of the rear of the window.

With the window still in the up position, bolt in this brace and attach the tab mentioned earlier at the bottom of the front run channel. The slotted hole in the brace allows side-to-side adjustment of the bottom of this channel.



The two lower regulator bolts are in slotted holes that will allow you to rotate the glass front to back.

There is a window-up stop at each end but these can only be roughed in until the door glass and all of the weatherstripping is in place.



REGULATORS: HOW IT ALL WORKS

Here are the different adjustment points for a '68 Barracuda quarter window. Most other cars will be similar. Points A and B allow you to move the front run channel side to side, which will adjust the leading edge of the window left or right if you move them in the same direction or tip the top of the window in or out if you move them opposite one another. Point B will have a greater tipping effect. C and D work basically the same for the rear channel. The regulator pivots at point E, so moving the bolts at F will rock the window front to back. Because the pivot point is near the front, this effectively allows you to raise or lower the rear corner of the glass. G and H (not installed yet) are the window-up stops that prevent over-raising the window.

The side and vent windows install as a unit. Be sure the vent widow channel is clean; lube it with some white lithium, then slide the door window into the vent window channel.

Put some grease on the vent window pivot as well.

Just like with the quarter window, clean and grease the window channel and the regulator. Bolt the regulator loosely in place.

An extra pair of hands would be very helpful for this step. Starting at the back of the door and with the assembly rotated 90 degrees, insert the bottom of the vent window channel into the window opening, rotate the windows back to parallel, then slide them forward and insert the windows into the door.

You'll use this stud at the end of the vent window frame to tilt the whole assembly to the front or back to align the vent window with the A-pillar.

At the very front corner of the vent window, this slot allows vertical placement of the window frame. Leave the bolt a little loose for now and lower the window into the door watching out for the regulator on the way down.

This slotted tab supports the back half of the vent window frame. You'll loosen the bolt through this access hole in the inner door frame so you can adjust the rotation, and rise and fall of the vent window.

Side-to-side and fore-and-aft placement of the bottom of the front window channel is set by accessing this stud through a hole in the bottom of the door. You'll use this mostly to tip the top of the glass in or out.

You'll need to unbolt the regulator to slide the roller onto the window channel. Roll the window all the way up when you are done.

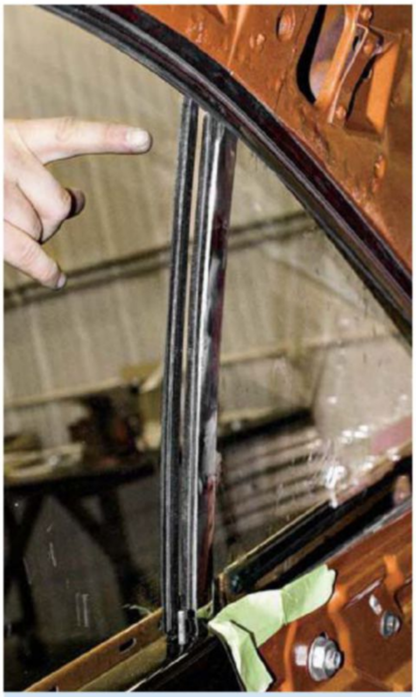
With the window up, install the rear channel. The two bolts on either end of this channel allow you to move the glass side to side and tip the top in or out. Before you begin adjusting your windows it is critical that the door first be properly aligned and that any new weatherstripping is in place.

Start your adjustments by setting both the angle and the height of the vent window to the A-pillar. The door window should now match up pretty close to the top weatherstrip but it's possible that you may need to slightly rotate the entire assembly. Next, adjust the rear channel so the top edge of the glass is even, front to back, with the weatherstrip. Set how tight the window fits against the weatherstripping by tipping the top of the window in or out. You can check this by closing the door on a new dollar bill. You've got it right when the bill will pull out but not easily.

SOURCES

MUSCLE CAR RESTORATIONS
715-834-2223
WWW.MUSCLECARRESTORATIONS.COM

YEARONE
800-932-7663
WWW.YEARONE.COM



WINDOW ALIGNMENT

As you can see, our quarter window is too far inboard. The top of the glass also needs to be tipped out a little. Both can be adjusted by working with the front window channel until the door glass seals tightly against the leading edge of the quarter window. As you are doing this, keep an eye on the top of the glass to be sure that a good seal is maintained against the top weather-strip. Don't be afraid to move the door glass inboard a little if necessary. You also need to check the vertical alignment between the windows. Rotate the quarter window if this is off. Expect to do some fiddling to get everything just right and don't forget to roll each window up and down a couple of times to check for smooth operation. It's also a real good idea to run a hose around the windows to check for leaks before you replace the door panels.

BY CHRISTOPHER CAMPBELL
PHOTOGRAPHY BY KEVIN MCKENNA

TAKE A SEAT

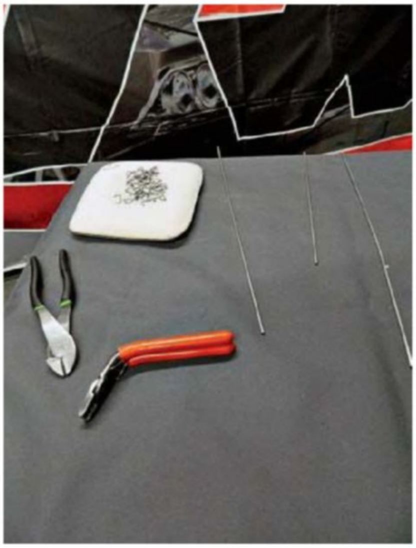
TMI'S PRO SERIES SEATS FOR MOPARS OFFER A CUSTOM INTERIOR FOR AN OFF-THE-SHELF PRICE.

Take a good look at the seats in your muscle car. If they're stock, they're flat as a board, right? That was just the standard shape of seats for decades in America prior to the mid 1980s. That basic shape plus a seatbelt works fine for straight-line blasts, but when we start asking for more grip in the cornering department, those flat seats start becoming an impediment to all the improvements you've made.

That's because no matter how well belted you are, if a seat doesn't have side bolsters to prevent your hips and shoulders from sliding across the seat surface, you'll end up fighting to hold yourself in place while simultaneously trying to turn the steering wheel. Think about it this way: not only is your attention split, thereby slowing your reactions, but your arms and body are tensed to hold yourself in the seat and

"…when we start asking for more grip in the cornering department, those flat seats start becoming an impediment to all the improvements…"

The TMI Pro-Series low-back bucket seat begins with a brand-new custom tube frame from TMI that's much stronger and more versatile than anything OEM from the 1960s.



TMI builds each seat by hand and the tools they use are very simple hog ring pliers and hog rings, rods, and diagonal cutters. Also needed are interior trim adhesive and some baling wire.

Here's a pro upholstery tip: Use a thin plastic bag over the seat foam to ease slipping the upholstery over the new foam.

Baling wire is pulled through the wires molded into the foam and around the frame rods to secure foam to the frame.

Next, the technician inserts the listing rods into the loops on the inside seams of the upholstery.

Hog rings are pinched into place in several spots to keep the listing rods secured to the molded-in wire in the seat foam.

Space the rings out pretty evenly to make sure there is enough bite to keep everything in place.

Now it's time for the good-looking part! With the inserts hog-ringed down, the upholstery is rolled over the edges of the foam, then smoothed and stretched tight as you go.

cannot respond as crisply as they could otherwise. Trust us, it's far better to only give your arms one job, and that's to direct the car.

So now you can see why in the past couple decades seat bolsters have become a given on new cars. We're actually so used to them now that you probably haven't noticed that any given modern commuter sedan has more bolstering in the seat than any vintage muscle car ever did. That's just unacceptable. For some, the option to switch to a modern high-back sport seat fits with the look of their project, but if you really want to maintain that vintage vibe, you have to stick with something that looks more retro. Thankfully, TMI has stepped up to fill in that gap with their Sport, Sport II, Sport R, X, XR, and now Pro Series seats that offer modern, aggressive bolstering on the top and bottom sections for more driver control. Moreover, these still retain a lower-back–style option that look more appropriate in a vintage car.

After long being absent from the Mopar scene, TMI is stepping into our arena with these all-new seats that will be available in both low- and high-back design. To see what goes into crafting a pair from scratch, we visited TMI's headquarters where they were busy creating the Pro-Series Sport XR Seats for a SEMA debut car: a '66 Coronet known as Project Ragnet, owned by American Powertrain. Here's how they did it. *MM*

"…if a seat doesn't have side bolsters to prevent your hips and shoulders from sliding across the seat surface, you'll end up fighting…"

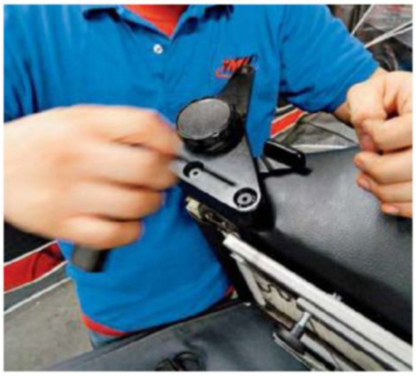
On the backrest upholstery, the technician stretches it around until the zipper seam meets, and he can zip the backrest closed. We love that simplicity.

To secure the bottom edges of the upholstery to the frame, it's stretched tight and J-clips are slid over each edge and onto the frame rods.

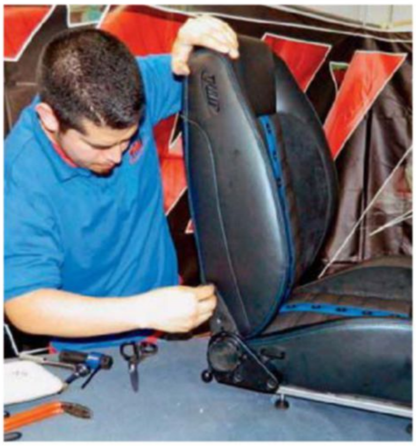
"Thankfully, TMI has stepped up to fill in that gap…"

You may need to go back and massage the upholstery over the bolsters a bit to remove wrinkles. Use a touch of steam for this.

With all the upholstery stretched tight, next he bolts the seat track sliders to the bottom of the seat frame.



Next up is the hinge and tilt assembly. This goes together quickly on the bottom side with all supplied hardware.



You may have to fish around a bit to locate the hinge mount hole on the top half, but once you've found it, alignment and installation is simple.

Looks great, doesn't it? The price of a pair of these premium Sport XR seats is quite reasonable at around $1,800 MSRP, front. (Base models start at $1,200.) TMI also offers various sizes of rear seat upholstery in oversized sections to allow a trim shop to cut it to fit the rear seat and panel configurations. Small, medium, and large trim sections will be offered to complete the interior of your car so it matches the TMI Pro-Series seats in the front.

SOURCES

TMI
888-460-0640
WWW.TMIPRODUCTS.COM

BY STEPHEN KIM ✪ PHOTOGRAPHY BY JOHNNY HUNKINS

DUMMY-PROOF EFI

QUICK FUEL TECHNOLOGY'S NEW EFI SYSTEM LETS ANYONE GET INJECTED IN A SINGLE AFTERNOON. WE SHOW HOW ON A '72 CUDA!

For decades, the long laundry list of complaints against EFI haven't changed. It's too complicated, too expensive, too difficult to install, and too ugly. Fair enough, but have you checked out the newest options lately? In recent years, aftermarket EFI systems have entered a Renaissance, and are now just as idiot-proof as a carb. Better yet, by emulating the look and feel of a four-barrel carburetor, installing one is as easy as yanking off that old carb, and bolting a new EFI throttle body in its place. Perhaps the most substantial perk these new systems have to offer is their self-tuning capability. Even carbs can't do that. So if you're competent enough to order up a greasy pizza with a smartphone app, you're competent enough to tune EFI. It all sounds too good to be true, but after installing Quick Fuel Technology's new QFI system in a single afternoon on a '72 'Cuda, we're believers.

As one of the most reputable names in the carburetor business, Quick Fuel Technology knows a thing or two about building fuel atomizing devices. It just so happens that in its latest innovation, QFI uses four fuel injectors and a throttle body in lieu of a baseplate and boosters. The throttle-body injection arrangement makes for a far simpler and prettier install than a multi-point system, yet it still offers substantial improvements in driveability, cold-start performance, emissions, and fuel mileage. While it's easy to dismiss some of those perks as irrelevant, chances are you don't get to drive your hot rod as much as you'd like, which makes brisk cold starts very appealing. Likewise, the aroma of unburned hydrocarbons probably aren't as pleasant as they once were in your youth, and enhanced fuel mileage will actually help offset the cost of investing in a new EFI system. The potential horsepower benefits of EFI over a carb can be debated for all eternity, but since EFI does not rely on a weak vacuum signal at low rpm to pull fuel through the boosters, the result is a big-time increase in low and midrange torque.

At the heart of the new QFI system is a billet four-barrel throttle body. The fuel injectors, rails, MAP sensor, and

"...if you're competent enough to order up a greasy pizza with a smartphone app, you're competent enough to tune EFI."

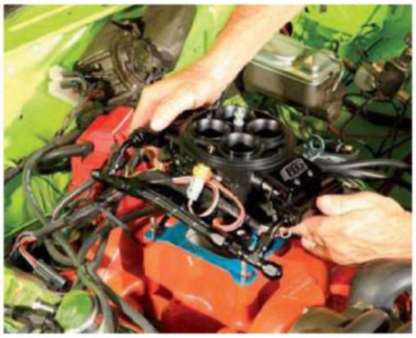
The QFI system is available in two different configurations. The Base Kit (PN QFT500BD) lists for $1,999, and includes the throttle-body assembly, ECU, handheld controller, wiring harness, and a wideband oxygen sensor. The Master Kit (PN QFT-500BDM) checks in at $2,149, and adds a fuel pump, filter, pressure regulator, gauge, and fuel lines to the package.

The QFI throttle body features four 66-lb/hr fuel injectors that can support up to 525 hp. Systems with larger injectors will soon be available for higher horsepower applications. The throttle body is offered in both a black diamond and a polished finish, and it can be adapted to fit a 4500-style intake flange by using an optional adapter (PN 300-4145-1A).

throttle-position sensor are all integrated into the throttle-body unit itself, making it a direct bolt-in replacement for a 4150-style carburetor. The kit also includes an ECU, wiring harness, and a handheld tuning controller. Upon installation, the ECU automatically creates a baseline fuel map using basic engine parameters (cubic inches, cam specs, target air/fuel ratio, and more) entered in through the handheld controller. Next, fire up the motor, and the ECU immediately begins fine-tuning the fuel curve based on feedback provided by the wideband oxygen sensor and MAP sensor. This is as easy as high tech gets. Now on with the install! MM

The brain of the operation is QFI's blazingly fast ECU that's covered in a slick billet housing. Unheard of just a few year ago, the ECU can maintain closed-loop operation under WOT to instantaneously adjust the air/fuel ratio. A truly unique feature of the QFI computer is that it can interface directly with both a ready-to-run distributor or an aftermarket ignition box to customize the timing map.

Our '72 Cuda test subject is equipped with a numbers-matching 340 small-block. The mostly stock setup has been bored .030-inch over, and uses stock cylinder heads, a mild COMP Cams hydraulic roller, 10.0:1 compression, and a Weiand dual-plane intake manifold. It kicks out 360 hp on the engine dyno, and is very similar to what many street Mopars also have underhood. After disconnecting the battery, unhooking the throttle cable, removing the gas cap, and removing the fuel feed line from the fuel log, we pulled the QFT 650-cfm carb off the intake manifold.



Since the injectors are integrated directly into the throttle-body assembly, there's no need to monkey around with welding up injector bungs on the intake manifold. The QFI throttle body literally drops right onto the intake flange. From there, it's simply a matter of bolting it down, and reconnecting the fuel line, throttle cable, and vacuum hoses.

One of the many great perks of EFI is that it factors in coolant temperature when adjusting the fuel and ignition maps. That means there's far less chance of melting a motor if coolant temps spike momentarily. The QFI system includes a 3/8-NPT coolant temp sensor that helps the ECU keep tabs on engine heat. After screwing the sensor into an empty intake manifold port near the thermostat housing, we plugged it into the green/back harness coming off the throttle body.

The QFI ECU is durable enough to be mounted underhood or inside the passenger compartment. For a cleaner appearance, we opted to mount it on the passenger-side footwell. The main wiring harness was routed through a grommet in the firewall. Next, we plugged the main wiring harness into the ECU before routing a piece of 3/8-inch vacuum line from the ECU unit to the throttle-body MAP sensor. Wiring it up couldn't be any easier. Attach it to the hot and cold sides of the battery, connect it to a switched ignition source, and that's it.

The wideband oxygen sensor should be installed 4 to 6 inches aft of the collector pipe, and at least 20 inches rearward of the cylinder heads. It can be positioned on either bank of cylinders, and should be angled 10 degrees above horizontal to prevent moisture buildup. After finding a suitable location and drilling a 5/8-inch hole, the sensor bung can be clamped or welded onto the pipe. We applied antiseize to the threads before screwing the sensor in, then plugged in the harness cable from the throttle body onto the oxygen sensor.

Since the fuel pressure in an EFI system is six to seven times greater than in a carbureted fuel system, the QFI kit includes a new high-pressure inline fuel pump and braided hose. The pump includes a 100-micron pre-filter integrated into inlet fitting. Wiring the pump is as easy as attaching the hot wire from the ECU to the pump, then attaching a ground from the pump to the chassis.

To ensure that the pump is gravity-fed properly, it must be mounted below the fuel tank outlet. We attached it to the passenger-side framerail. After screwing the supplied 3/8-inch barb fitting into the fuel tank outlet, we installed the necessary fittings onto a section of 3/8-inch hose and attached it to the pump inlet. The 'Cuda's tank already had a vent tube, but cars that don't have one will need a vent measuring at least 1/4 inch in diameter. If performing any type of modifications to the tank, it's imperative to first drain it of all fuel and fumes.

To finish up the plumbing, the fuel pressure regulator was mounted to the passenger side of the firewall. After cutting the supplied fuel line to the correct lengths, we attached the main feed line from the pump to the regulator inlet, and the engine supply line from the regulator outlet to the fuel log. Unlike a carbureted fuel system, most EFI systems use a return line. As such, we ran a 3/8-inch return line from the bottom of the regulator to the top of the fuel tank using a supplied barb fitting. For some cars, this may require installing a bung on top of the fuel tank.

The final step in the parts installation process is connecting the main harness from the ECU to the throttle-body harness. The harness includes a number of optional inputs and outputs for the tachometer, cooling fan, coil/ignition, and fuel pressure gauge.

The finished product looks superclean and entirely at home on a numbers-matching, mostly original engine and chassis combo. Even your carburetor's old air cleaner assembly should swap right over.

Perhaps the most miraculous aspect of the QFI system is how easy it is to establish a baseline tune. When turning the key to the "On" position for the first time after installation, the hand-held controller asks for some very basic engine parameters such as engine displacement, number of cylinders, timing advance, camshaft size, and rpm limit. Although they can be fine-tuned, the unit comes pre-programmed with optimum air/fuel ratios at idle, cruise, and WOT. With the key still in the "On" position, adjust the fuel pressure to 45 psi, then the motor is ready to fire up. An advanced setting menu allows using QFI as a fan controller, and adjusting fuel delivery during hot and cold cranking.

With the new QFI system installed, start-up time and idle quality were immediately improved. On the road, throttle-response was noticeably snappier as well. Immediately after firing up the QFI system for the first time, its adaptive learning feature continually adjusts the air/fuel mixture based on road conditions. If further fine-tuning is desired, the system can also be hooked up to a laptop and programmed using QFI's Dashboard software.

SOURCES

QUICK FUEL TECHNOLOGY
270-793-0900
WWW.QUICKFUELTECHNOLOGY.COM


PG CLASSIC Restoration Parts
We Specialize Reproduction Muscle Car Restoration Parts
BODY
CONSOLE
DASH
INTERIOR
LIGHTS
PERFORMANCE
AMC
FORD
GM
Dash Bezel
Dash Pads
Headliners
Headrest
Seat Covers
Seat Foam
Seat Belts
Seat Track
Door Panel
Steering Wheels
Door Handles
Fuel Caps
Armrest Bases & Pads
Windows Cranks
Sill Plates
Pad & Bezel
We reproduce a wide range of new High Quality, like original Mopar and AMC muscle car parts. We use our own tooling and injection moulds. Reasonable price for retail and large quantity pricing.
AMC Dash Bezel
AMC Taillight
AMC Rocker Molding
AMC Mirrors
Falcon Gauge Lens
GTO Console Plate
Falcon Molding
GTO Taillights
Mustang Couga r Boot Molding
Falcon Top Latches
Console Plates
Exhaust Tips
Taillight
Side Marker
Indicator
Mirrors
Luggage Rack
Shifter Kit
Center Caps
Scoop
Air Grabber
Grille
Medallion
Molding & Trim
Bumper Guards
Toll Free: 1-888-473-5855
www.PGCLASSIC.com

TECH

TEXT AND PHOTOS: JOHNNY HUNKINS

PROJECT VIOLENT VALIANT: PRACTICAL POWER PIPES

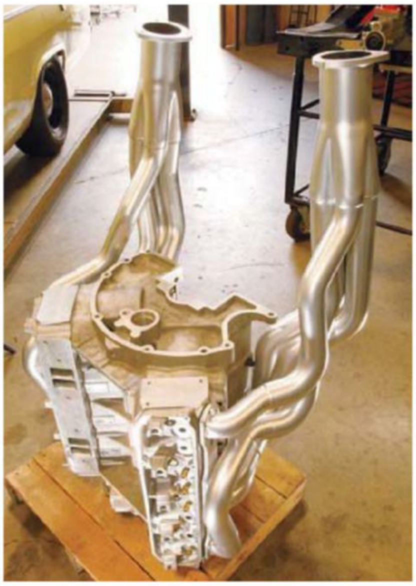
REMOVING FUMES FROM A 660HP BIG-BLOCK A-BODY WITHOUT KILLING POWER USUALLY MEANS TROUBLE, BUT NOT WITH THIS TTI EXHAUST!

The idea sounded simple enough: build a massively powerful low-deck Chrysler wedge with a stock-location exhaust port, then drop it into our '68 Plymouth Valiant A-Body. Logic dictated that would be the easiest route, but we found out otherwise. The root of our problem—if you could call it that—is that our 500ci Indy-built low-deck wedge made so much power through Indy's EZ-1 cylinder head that no A-Body header on the planet was capable of moving that kind of exhaust flow. Until the introduction of Indy's lineup of EZ-1 cylinder heads, making anything north of 550 hp with a stock-location 383/400 exhaust port was simply unheard of. In spite of the low-deck wedge's designation as a big-block, in stock form it is for all intents a small-block, and is well-served—even in breathed-on form—by the existing 1.75-inch header market.

When the cylinder head aftermarket finally began servicing the B/RB engine family with high-flowing heads, it was almost exclusively with raised exhaust ports, and most header manufacturers followed suit. A-body long-tube headers with primary tube diameters of 1.875-, 2-, and even 2.125-inch sizes are all available, but they all share the same trait: they're for a raised exhaust port. But then Indy came out with their game-changing EZ

> "The root of our problem … no A-Body header on the planet was capable of moving that kind of exhaust flow."

We went into our '68 Valiant Project blind, not realizing that nobody made a large-diameter header for a low-deck big-block in a '67-76 A-Body with a stock location exhaust port. Then TTI came to the rescue with these pipes! TTI's 2-into-2.125-inch long-tube step headers (PN 400SR-218) will also fit '62-74 B-Body, and '70-74 E-Body.



Our '68 Valiant headers also stipulated that they play nice with Indy's aluminum Maxx block, which has wider pan rails and upgraded cross-bolted mains. The scene here at TTI's Corona, CA manufacturing facility depicts an Indy Maxx block with Indy EZ-1 cylinder heads mocked up with TTI's long-tube headers. Note how close the tubes pass to the block pan rails and main cap fasteners.

Mike Davis is the brains behind all new header projects at TTI. He designs, mocks up, and fabricates all of TTI's prototype headers and manufacturing fixtures, and this stock-port long-tube step header is his most recent baby. We threw Mike into the deep end of the pool, where he installed a final production set of 2-into-2.125-inch long-tube headers and exhaust into our '68 Valiant with us rolling video and taking photos. The operation took him just two hours, and there were no surprises with bolts, spark plugs, starters, steering components, or strenuous sessions with prybars!

A big-block in an A-Body usually translates into having little or no room to access header bolts or spark plugs, and other than the No. 6 plug (second from the rear, passenger side) having to go in from below the car with a drive extension, the install was cake. Tip: Taping up the primaries with masking tape will protect the ceramic finish during installation.

On the driver side, note how the steering linkage of our RMS rack-and-pinion conversion has been removed to facilitate installation. If your steering is stock, the steering column and linkage can stay in place. With a stock steering setup, you'll need to remove the starter, install the header, then bolt the starter back up. Once again, there's plenty of room to install 3/8-inch header bolts and plugs.

Here you can see the steering linkage for the Reilly Motorsports rack-and-pinion going back in after the driver-side header is in place.

cylinder head program, which amped up the power with Max Wedge–sized intake runners—and more interestingly, exhaust ports in the stock location. We jumped on the idea, and had Indy build us a 500ci low-deck wedge using their aluminum Indy Maxx block and EZ-1 cylinder heads. With an aluminum Mod Man intake, a dual-quad Edebrock carb setup, and a COMP mechanical cam, it belted out 657hp at 6,100 rpm and a rotund 662 lb-ft of torque at 4,500 rpm, all through a 2.125-inch dyno header.

By the time we dropped the Indy Maxx into our '68 Valiant, we had discovered our three existing header choices, and they were all unacceptable. 1). Use a small 1.75-inch header or exhaust manifold and kill something north of 100 hp. 2). Use a set of 2-inch diameter fenderwell headers, butcher the inner fenders, and use skinny front runners to keep the tires from rubbing. Or 3). Build a set of freakishly expensive custom headers and try to convince readers they could somehow do this themselves.

Meanwhile, the folks at Indy and TTI had been contemplating the same thing. They had come to the same conclusion as us because Indy Cylinder Heads sent an Indy Maxx low-deck block and a set of EZ-1 cylinder heads to TTI for them to play with. The collaboration of these two companies should come as no surprise, with Indy being known for its high-performance Chrysler-based crate engines and components, and TTI being acknowledged for its class-leading Mopar-specific headers and exhaust systems. And while other companies certainly make some great hardware, both of these players are deeper into the Chrysler market than any of their respective competitors. It's literally a matter of

WHAT TO GET!

DESCRIPTION:	PN:	COST:
2- TO 2.125-INCH LONG-TUBE STEP HEADERS, COATED	400SR-218-C4	$892.00
3-INCH X-PIPE	XA30-MP	$296.00
3.5- TO 3-INCH HEADER REDUCERS	RED35X30X6	$53.00, PAIR
3-INCH DYNOMAX SUPER TURBO MUFFLERS	DYN 17793	$235.10, PAIR
MUFFLER HANGERS	MH-A30HA	$75.00 PAIR
3-INCH EXHAUST TURNDOWNS	TIP30-TD	$37.00 PAIR
TOTAL:		$1,588.10

survival that they put out the best Chrysler-based products possible.

When TTI "plays with" parts like Indy sent, they don't mess around. They got busy right away mocking them up in an A-Body front clip, bending some custom large-diameter pipes. TTI's decision to spec out a 2-into-2.125-inch stepped primary was based on the need to cover the largest of Indy's EZ heads—the 325cc, 370-cfm–capable, CNC-ported "Big Easy." This can be used on Indy low-deck crate engines up to 500 ci that when equipped with the "Big Easy" head can make power well over 800 hp on premium pump gas. Better yet, when other cylinder head makers step up to the plate with a wicked wedge head with a stock location exhaust port, the need for an A-Body header will already be met.

By the time we called TTI, we had our logic worked out and our speech prepared. Fortunately, TTI was already two steps ahead of us. They already had the headers designed and built, and they wanted to know if we'd be willing to give up our '68 Valiant as a mule for test-fitting the production components. Our wish list was


These reducers channel the 3.5-inch header collectors into a 3-inch pipe, and also have provisions for oxygen sensors. We'll be needing those down the road when we tweak our dual-quad Edelbrock carb setup on the dyno. Note how the headers clear the pan on our TCI Streetfighter 727 trans.


This money shot shows how nicely the TTI headers clear everything. Although we have an RMS AlterKtion front suspension, note that the TTI pipes also work with the factory suspension, stock torsion bars, and factory steering. You can also make out the proximity of the header primary to the engine block. TTI dimpled the passenger-side header in one place and the driver side in two places in order clear the cross-bolted main fasteners on the pan rail. If you've got an Indy Maxx block, you will need to request this service in advance. OE "B" blocks will not need this prep.


TTI also offers complete exhaust systems for most Mopars. Due to our Street-Lynx four-link rear suspension, we ordered off the TTI menu *a la carte*. This 3-inch X-pipe system uses slip-fit, mandrel-bent tubing with U-clamps for easy installation, and costs $296.


The 3-inch X-pipe system was pre-assembled, and slipped right on with only minor adjustment. An X-pipe like this is proven to maximize power at the wheels due to its unique scavenging advantage over a straight, dual-pipe arrangement or even an "H" balance tube.

apparently already handled, so it was simply a matter of towing the Valiant over to TTI's Corona facility, and seeing for ourselves if the fit and finish was up to standards.

When we got to TTI, what we found was a well-organized operation that had the subject headers already prepped with the satin-ceramic coating we requested. These headers were comprised of mandrel-bent mild-steel tubes built on TTI's final production tooling jigs and welded to TTI's laser-cut 3/8-inch-thick flanges. Like all TTI production headers, they had been hand-finished for maximum flow at the exhaust port, and all primaries were built with a 1/8-inch expansion step in them at the midway point, a proven design that fattens the torque curve incrementally. We also opted for some 3-bolt, 3.5-to-3-inch reducers with O2 fittings, and a dual 3-inch X-pipe exhaust with Dynomax Super Turbo mufflers and axle turndown tips. We got to see firsthand both the A-Body mock-up fixture that TTI used to prototype the headers, as well as the aluminum Indy Maxx block and cylinder heads that Indy had sent over. In spite of these TTI headers being the first production pieces ever bolted to a real car, it only took a couple hours to get the entire system bolted on. That's a testament to how well the team at TTI designs their headers. Let's take a closer look now at how it all went down! MM

We used two TTI exhaust hangers, one on each of the two rear seatbelt anchor studs. The stock anchor studs were removed and replaced with ones long enough to accommodate the additional thickness of the hanger.

Dynomax Super Turbo mufflers give any hot rod a very distinctive rumble, and they are among the best at preserving the system flow and horsepower of a high-performance V-8. Our dual 3-inch system will end at the axle because the combination of a Dana-style rearend and RMS Street-Lynx four-link suspension does not provide ample clearance for an over-axle system. Even if it had though, we would've chosen axle turndowns for the fabulous sound!

The last thing to add was a pair of 3-inch turndown tips, which we angled to outflow directly in front of the rear tires. This will provide spectacular clouds of billowing tire smoke during burnouts! With the exhaust positioned correctly and the clamps aligned over their respective unions, the whole system was tightened up. Want to see more? Go to the TTI website (www.TTIExhaust.com), and watch our videos on both the installation, and how TTI builds headers.

SOURCES

TUBULAR TECHNOLOGIES INC. (TTI)
951-371-4878
WWW.TTIEXHAUST.COM

HERO CAR

A NOTORIOUS '70 CHALLENGER MOVIE CAR GETS READY FOR ITS NEXT ROLE AS A CORNER CARVER.

BY CHRISTOPHER CAMPBELL ✪ PHOTOGRAPHY BY JORGE NUNEZ

Everyone has a favorite movie car. Even most people who aren't into cars otherwise can name one or two they really like. Of course it goes without saying that car guys have a special affinity toward these mechanical stars of the silver screen. The General Lee, Eleanor, the GTO from *XXX*, the *Bullitt* Mustang, The *Vanishing Point* 'Cuda, Herbie, the Charger from *Dirty Larry, Crazy Mary*, and so forth. They could be memories from childhood or current action flicks, but it proves that sometimes the cars really are the stars that stick with us the most.

We have a love/hate relationship with muscle cars in the movies. On one hand, getting our favorite era of vintage steel and chrome in front of the general populace helps breed love and appreciation for the style and raw power that we love about them. On the other hand, Hollywood is more famous for destroying dozens of cars per movie than preserving them. For any one car you see on screen in an action movie, many more clones were made and mangled, or totally destroyed. The attrition rate on classic cars is already too high thanks to the usual suspects of wrecks, rust, and age, so seeing more thrown on the fire always stings.

Now imagine you're the guy whose business it is to supply those cars to the movie industry. They need to be built to spec, as many of them as needed. And you're not just some opportunistic businessman who couldn't care less about the cars, you're an honest-to-goodness, lifelong car guy. That's the precarious situation for Ted Moser of Picture Car Warehouse in Northridge, California. Moser loves cars of all stripes, but in particular muscle cars, so the recent resurgence of them showing up in films has been both a blessing and a heartache. His job is to make sure that not only does the production get multiples of the exact style of car they need, but to also see that they are professionally prepped for any stunts, crashes, or mayhem the script calls for. Moser goes into every project knowing most of the cars he provides for any project are going to be damaged, often irreparably. That's pretty heavy for a car lover. Moser's answer is to always choose stripped, severely damaged, wrecked, or rusted cars to be mocked-up for the big stunts. For example, the

Other than the 18-inch wheels, car builder Ted Moser worked hard to make sure that everything stayed exactly as it was on set for *2 Fast 2 Furious*, even down to the YearOne license plate and decals. (YearOne supplied most of the resto parts for the film's assortment of muscle cars, and was also one of the film's placement sponsors.)

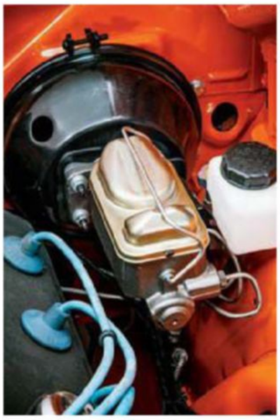
'69 Camaro that is launched onto the boat in *2 Fast 2 Furious* (*2F2F*) was a massively rusty car found in Florida that there was no hope of saving. There was lots of body filler and foam employed to make it look good enough at 50 feet for the jump scene. "I like to say that my trademark is 'no muscle cars were harmed in the making of this movie,'" Moser told us with a laugh.

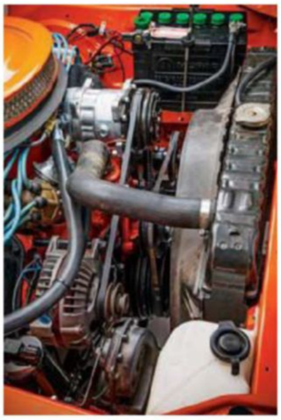
Nevertheless, just like the hero of the story needs to survive the odds to come out on top at the end of the movie, there's always at least one car known as the "hero car" that will come out on the other side. While the rest will be pieced together only as much as necessary for safety and reliability, the hero car is a step above the rest and is typically fully finished and nicely built. This Challenger was one of the very few that escaped with its sheetmetal still intact in '03's *2F2F*. And it wasn't even the actual hero car.

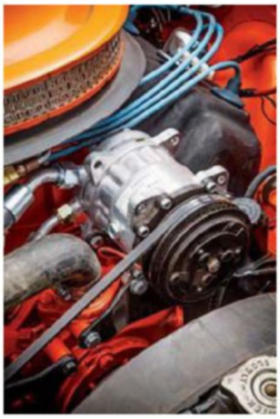
It was fortunate enough to be Moser's personal car, though, so it received better care and consideration. As is typical for movie cars, this Challenger didn't start out as anything special. It was just a standard 318-powered car with an automatic trans. As matter of fact, all of the cars in the movie, other than the 426 Hemi powered hero car still owned by the production company, were very simple recipes: mild 318ci, automatic trans, and 4.56 gearing. Why such big cogs? "The camera has no sense of speed," Moser told us, "so 60 to 70 mph is fast enough. You just want it to come out of the hole quick."

Once the movie wrapped and Moser got the Challenger back, it was such a nice car that he decided to go the full route and make it just like the hero car in the movie. Thanks to a stellar reputation, production companies often work directly with Moser to create the style of the cars, and

It may have had a 318 while on set, but now underhood lives a mostly stock 1970 date-coded 426 Hemi built by "Hemi" George Ilanjian. The retrofit is so good that it even passes muster with knowledgeable Mopar aficionados.







"HOLLYWOOD IS MORE FAMOUS FOR DESTROYING DOZENS OF CARS PER MOVIE THAN PRESERVING THEM. "

The American Powertrain shifter is the only real clue that a TKO600 lurks under the tunnel rather than a four-speed.

The interior is exactly stock and perfectly restored with a functioning original eight-track player and six-way bucket seats. Moser also worked with Classic Air to develop an electronic conversion for the A/C that uses the original switches. Fun fact: The hero car's color and style has to be matched to the location, as well as the actor and his or her wardrobe. A beige car in front of a beige house doesn't work, or an all-black wardrobe in a black interior.

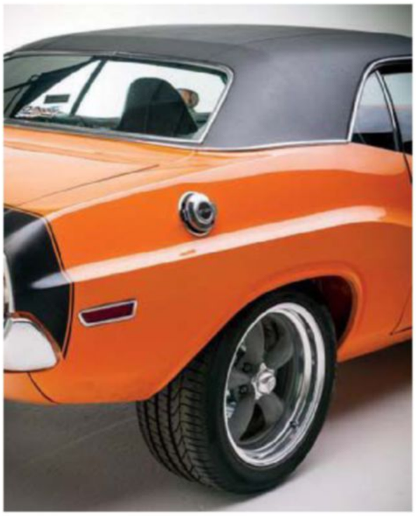
for *2F2F*, Moser had convinced them to go with a thoroughly vintage muscle vibe, so it already had the look he liked. And it just so happened that Moser had a 1970 date-coded Hemi sitting around that he had built to save for just the right project.

There was only one problem: Moser's friend Jon Ricker had gotten wind of Moser's hero car clone. Ricker is a lifelong car collector who has a thing for movie cars. Not just any cars, though; Ricker goes for the truly one-of-a-kind, legit hero cars. For example, there may be plenty of Eleanor clones out there, but until Bruckheimer is ready to part with the one real hero car, he'll have to pass. So this Challenger normally wouldn't fit into the category for his collection, but it was in the movie, and considering Moser was building it, he knew it would be right. It wasn't easy talking Moser out of it, but eventually

he acquiesced since Ricker was a friend and someone he knew would take excellent care of the Challenger.

All that was about 10 years back. Amazing how time flies, right? Since then, Ricker has been enjoying the Challenger with his two sons. He may have valuable and unique cars, but Ricker does not believe in letting them collect dust. Everything gets driven, and the Challenger is one of his favorites to drive. Lately, Ricker and his sons had been tossing around the idea of getting a Pro Touring car to play with, but instead they decided to update the Challenger. It seemed like the logical choice since it was not a restored original car and already had a street machine vibe. It was a movie car, though, so Ricker wanted to ensure that the look and feel was preserved. He knew only one man was right for the job.

Though he is still one of the biggest go-to guys for the movie industry, in the past few years Moser has started to create more custom-built cars for private customers since word has gotten around that he and his crew are meticulous. For example, he recently finished a '66 Chevelle for Ben Affleck. Affleck loves



it so much it's become his daily driver. (What, you didn't see it in the TMZ footage?) Ricker wanted something along those lines, with an upgraded suspension for handling, and more aggressive brakes. He knew he'd have to upgrade the wheel diameter and width, but other than that Ricker wanted the Challenger to remain very true to what it was in *2F2F*. After all, we are still talking about a car that gets mobbed at shows because of its history. It was critical to Ricker to preserve that history while still making it something he could enjoy more.

Now loaded with a Reilly Motorsports suspension and Master Power brakes, the Challenger has a whole different attitude, but it's still visually identical to its previous form. Though street driving is really the main plan, Ricker is tempted to get the Challenger on track to see what it can do now, that is assuming he can get it back from Moser. Currently, the Challenger is still on the West Coast at Picture Car Warehouse, and from what we hear Moser is pretty eager to get it out on track himself. You know, because he insists on only delivering safe and well-sorted cars, Moser feels it needs a little "testing" before returning home! ***MM***

FAST FACTS

1970 DODGE CHALLENGER
CAR OWNER: Jon Ricker
Blacklick, OH

ENGINE

TYPE: 426ci Gen II Hemi

BLOCK: 1970 Dodge

ROTATING ASSEMBLY: OEM crank, rods, pistons

CYLINDER HEADS: OEM 1970

CAMSHAFTS: OEM 1970 spec

VALVETRAIN: OEM

INDUCTION: dual Carter AFB carbs

INTAKE MANIFOLD: Mopar 2x4

OILING: Milodon pan

EXHAUST: TTI long-tube headers

IGNITION: OEM

COOLING: OEM radiator and pump

OUTPUT: 469 hp at 5,600, 450 lb-ft of torque at 5,000

BUILT BY: "Hemi" George Ilanjian

DRIVETRAIN

TRANSMISSION: Tremec TKO-600 kit from American Powertrain

DRIVESHAFT: American Powertrain

REAREND: Dana 60 with 4.11 gears and Sure-Grip

CHASSIS

FRONT SUSPENSION: RMS AlterKtion K-member and Viking coilovers

REAR SUSPENSION: RMS Street-Lynx four-link with Viking coilovers

STEERING: RMS rack-and-pinion

BRAKES: Master Power Brakes 13-inch discs with four-piston calipers up front, 12-inch discs with four-piston calipers in the rear

WHEELS & TIRES

WHEELS: 18x8 and 18x10 American Racing

TIRES: 235/45R18 and 275/35R18 Pirelli


TRUE AMERICAN BILLET™
FOR YOUR CLASSIC MOPAR
MADE IN AMERICA
NOW AVAILABLE
S-Drive Serpentine Pulley Kits
for 383-426-440 Mopar
One part number gives you everything you need to accessorize your engine with American made billet aluminum and new, name brand components
Billet Aluminum Hood Hinges
Available for 1967-1970 B Body
EDDIE MOTORSPORTS
Call: 1-888-813-1293 ▸ Click: www.EddieMotorsports.com
Visit: 11479 Sixth St., Rancho Cucamonga, CA 91730
www.facebook.com/eddiemotorsports
ROAD TOUR
MEMBER
CALL OR VISIT OUR WEBSITE FOR A FREE CATALOG


DRAG STRIP, SHOW FIELD OR ROAD RACE...
ALTERKTION COIL-OVER SYSTEM
The RMS complete suspension systems do more than save weight and add clearance. They're designed with precise geometry for optimum control, even when you touch down from high wheelstands or hit the brakes from 8-second speeds. Easy to install and work with, the Alterktion system bolts up to factory frame rails. Complete from connection to steering column down to the spindles. Engine mount options include complete mounts to block, all are poly bushed spool-type mounts. Powder coated gloss black and ready to install.
STREET-LYNX REAR SUSPENSION SYSTEM
Get rid of your poor-performing leaf springs with RMS' Street-Lynx triangulated 4-bar system. By separating the locating system from the spring, it's possible to drastically improve geometry, traction, and handling while using a lighter spring and shock to provide excellent ride quality and wheel control. No cutting to weld in a single crossbar between the factory frame rails. Coil-overs mounted ahead of the axle eliminate wheel hop normally associated with 4-bar systems, yet allow stock gas tanks to fit. Lower links bolt into stock leaf spring location with the included adjustable front mounts, or links can be used in conjunction with standard inboard relocation kits and mounted under the frame rails for increased tire clearance. Includes Viking Double Adjustable shocks, standard. Axle housing not included. Choose rear axle type you'll be using - 8.75/Ford 9 allows TTI tailpipes, Dana 60 will not allow tailpipes. Shipped with RMS' recommended spring rates and free shock adjusting wrench.
COMPLETE BRAKING SYSTEM UPGRADES, TOO -
SL6-PISTON KIT
Add serious stopping power to your system with a 6-piston big brake kit. Requires 17" or larger wheels. Choose from slotted GT rotors, or drilled/slotted SRP rotors. Braided stainless steel brake hose included.
HYDRAULIC POWER BRAKE PACKAGE
Hydraulic power brake assist works by plumbing into power steering lines. No need for engine vacuum. Complete with Hydraulic Unit, Wilwood tandem master cylinder, and all hoses/hardware. Compatible with any brake kit, stock or otherwise.
RMS
Advanced Suspension Systems
EXCLUSIVELY FOR DODGE/PLYMOUTH MUSCLECARS
REILLY MOTORSPORTS, INC.
CALL 570-443-7440
WHITE HAVEN, PA.18661
WWW.REILLYMOTORSPORTS.COM
LIKE US ON FACEBOOK -
FACEBOOK.COM/REILLYMOTORSPORTS

WHO'S YOUR DADDY?

BILL REILLY THOUGHT HE WAS BUILDING JUST ANOTHER BIG-BLOCK DART. HE ENDED UP DESIGNING A PREMIUM MOPAR SUSPENSION AND CHANGING THE MOPAR AFTERMARKET.

BY STEPHEN KIM ✪ PHOTOGRAPHY BY JOHN MACHAQUEIRO

Spreading your precious DNA among the masses is every man's dream. At least until the child support bills show up. Bill Reilly just figured out a better way to do it. Using the fabrication abilities provided by his organic DNA to create cutting-edge suspension components has enabled him to spread his advanced mechanical DNA among the Mopar faithful. In the process of jump-starting the evolutionary process, he's forever changed the face of Mopar genetics. His '69 Dodge Dart is the car that started it all. For any Mopar infused with modern handling and ride quality thanks to Reilly Motorsports' line of AlterKtion front and Street-Lynx rear suspension systems, say hello to your daddy.

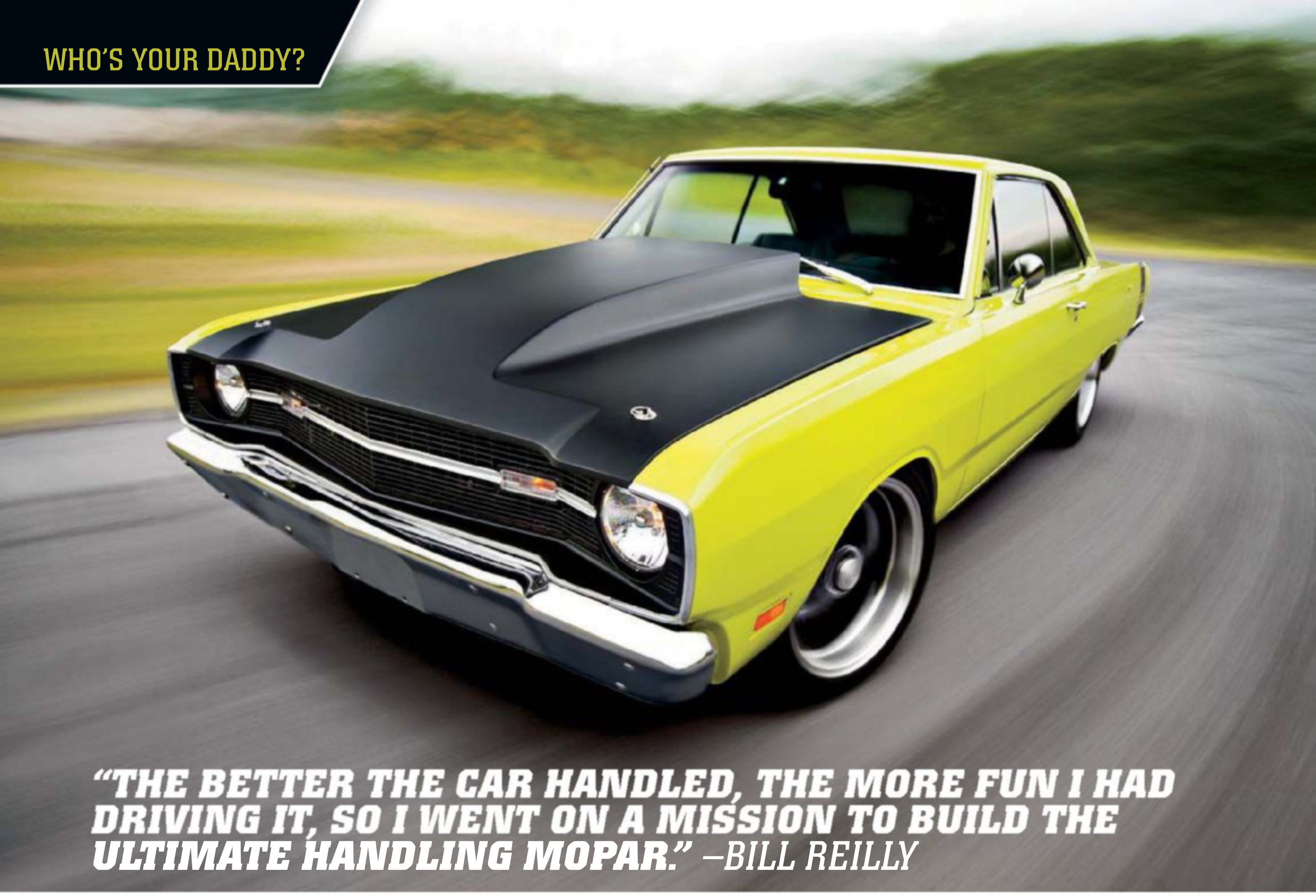
It takes a true diehard to launch an entire company dedicated to revolutionizing Chrysler suspension systems, and Bill Reilly has lived the Mopar lifestyle since birth. "I learned to say 'Mopar or no car' by the time I was 8 years old. When I was growing up, my parents had a '65 Dart, a '69 Road Runner, and a '73 Challenger," he fondly recalls. "I was always infatuated with cars, and I drew them in school until I saved enough money cutting grass to where I was able to buy a '66 Satellite. I later bought a '67 GTX, and I also had a '73 Town and Country wagon that my buddies and I outran the cops in one day. I saw this '69 Dart for sale in a gas station parking lot back in 1990 and I fell in love with it. Little did I know that it would literally change my life."

Initially, the plan was simple: Drop in a 440 and hit the gas. Upon doing that, however, Bill was far from pleased with how the Dart handled itself on the road. "This car was supposed to be just a cheap restoration done by a guy with a MIG welder in his driveway. Unfortunately, once I finished restoring the Dart it drove like crap," Bill quips. "I built it as a street/strip car with 4-inch-wide wheels up front and 28x10 tires in the back, but since there are no straight roads in Pennsylvania, I lost interest in that setup. The ride quality and steering were terrible, so I wanted to do whatever I could to improve the ride and cornering ability. The better the car handled, the more fun I had driving it, so I went on a mission to build the ultimate handling Mopar."

The short version of the story is that Bill scoured junkyards looking for a rack-and-pinion steering setup and other suspension parts he could swap onto his Dart. That quest eventually led to the birth of Reilly Motorsports, but obviously there's a lot that happened in between. "I have been working fabrication jobs of some kind my entire life. When I built the Dart, I was working at ski resorts building and repairing snow grooming equipment," Bill says. "These places didn't have big budgets, so they'd tell you what they wanted, gave you a bunch of raw material, and said, 'We don't care how you have to do it, just get

it done.' That experience helped me out a lot because what I thought was going to be a quick winter project after running to the junkyard ended up being far more involved. Trying to build a modern suspension for the Dart from scratch was like solving a puzzle. It really tripped my trigger and turned into an obsession. Eventually, building the suspension became the real project and the car was just something that held it all together."

That fateful project transpired in 1998, and Bill's friends started asking him to make suspension parts for their Mopars, too. A few years later, former *Mopar Muscle* editor Randy Bolig caught wind of Bill's killer Mopar suspension products. It wasn't easy, but Randy convinced him to put his parts on display at the Carlisle Mopar Nationals. "I was skeptical at first and thought, man, who's going to want to buy my stuff?' Then we got to the show, and people lined up 40 deep the entire event," he recalls. "I was shocked.

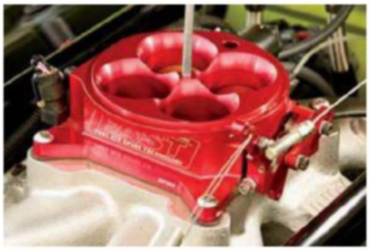


"THE BETTER THE CAR HANDLED, THE MORE FUN I HAD DRIVING IT, SO I WENT ON A MISSION TO BUILD THE ULTIMATE HANDLING MOPAR." –BILL REILLY

We then worked with YearOne on a tech article, and we've had a three-week backlog of orders ever since then. I didn't plan on any of this happening. I just wanted to sell enough suspension kits to be able to buy some aluminum cylinder heads for my 440 big-block."

In the years that followed, RMS expanded its line to include K-member assemblies—complete with all-new tubular control arms, spindles, coilovers, sway bars, steering racks, and disc brakes—for just about every old-school Chrysler platform on earth. RMS also builds complete Street-Lynx rear four-link kits as well. Although Bill's company experienced rapid growth during this period, it didn't leave much time to give the Dart some well-deserved TLC. "The Dart got beat to hell from years and years of parts testing. I got sick of having a lab rat, and wanted to have a nice car again," Bill says. "Around

Any Hemi is a good-looking motor, and the March accessory drive makes it look even better. Like many hot rodders, Bill hates wiring, so he handed over the EFI installation and wiring duties to Dennis Rostenbach at Rooster's Rod Shop.



As is no surprise for a car built by a guy who runs a leading Mopar suspension company, the Dart's stance is nothing short of perfect. The flat-black cowl hood contrasts the searing paint quite nicely.

seven years ago, I completely disassembled the car, redid the paint and bodywork, and built it back up from scratch. I wanted a car with modern performance technology that still looked like a traditional muscle car. The quarter-panels, doors, and fenders all needed work, and afterward, Delaney Auto Design painted the panels Dodge Neon Nitro Yellow."

With the bodywork complete, Bill predictably fitted the Dart with the latest and greatest K-member and four-link assemblies out of the Reilly Motorsports catalog. Braking duties are managed by gigantic Wilwood discs, measuring 14 inches up front and 13 inches in the back, while 18-inch American Muscle Bullitt wheels wrapped in Falken tires stick it all to the pavement. As for the old 440, it's not there anymore. Bill replaced it with a Ray Barton 528ci Hemi that spits out 707 hp. The details of exactly how he acquired the motor are unclear, but we know it involved some shrewd bartering with Bill's friend Jon Clark, who happens to be the former head of Mopar Performance. "All I can tell you is that I got it through a trade. It was the best horse trade of my life," he jokes.

Regardless of the exact means through which it was acquired, the 528 is one

The A-Body's interior features a custom dash, Auto Meter gauges, custom seats, a Flaming River steering wheel, an Alpine stereo, and a Classic Auto A/C system. As with the wiring, Rooster's Rod Shop gets credit for the work.

In lieu of rear seats, the Dart boasts a trick panel that houses four speakers and conceals two 10-inch subwoofers. The leather stitching matches the color of the body panels.

beast of an elephant. Based on a Mopar Performance block that's been bored to 4.500 inches, the combo features a Barton 4.150-inch steel crank and rods, and Diamond 10.0:1 forged pistons. Mopar Performance aluminum cylinder heads and an Indy intake manifold provide the air supply, while a custom Barton solid roller cam bumps the 2.25-/1.94-inch valves. Although Hemis are as deliciously old-school as you can get, Bill modernized it a bit with a FAST XFI EFI system. A Mopar Performance ignition system lights the fire, while TTI headers and Flowmaster mufflers provide the bark. Backing up the Hemi's epic output is a Tremec TR6060 six-speed manual transmission and an ACT clutch that send power back to a Chrysler 8.75-inch rearend fitted with Moser axles and 4.56:1 gears. As the ultra-aggressive ring-and-pinion set indicates, Bill never has and never will baby the Dart. "I beat the beans out it. I don't worry about driving through mud puddles or smoking the clutch because it's made for having fun," he says. In fact, Bill has so much fun with the Dart that it's in dire need of a bigger gas tank. "The Hemi only gets 5 mpg. With a 16-gallon tank, I can only drive about 70 miles before I have to start looking for a gas station."

In order to fit 295mm-wide tires, the Dart's wheelwells have been widened just a bit. With a hungry Hemi and a heavy right foot, the 16-gallon gas tank runs dry in no time.

After putting the finishing touches on the Dart, Bill ran it around the autocross at the Chrysler Nationals last year just to see what it would do. Just like they always have, the RMS hardware performed great, which Bill felt was a great way to send the car off into the sunset. Now that the Dart has come full circle, he's officially retiring it from lab rat duty. It's a fitting fate for a car that not only changed Bill Reilly's life, but also forever changed Mopar suspension technology for the better. Thanks to Bill and RMS, Mopars are no longer relegated to flopping around on antiquated torsion bars and leaf springs. Pro Touring Mopars of the world, say hello to your daddy! *MM*

FAST FACTS

1969 DODGE DART
CAR OWNER: Bill Reilly, 43
White Haven, PA

ENGINE

TYPE: Chrysler 528ci Gen II Hemi

BLOCK: Mopar Performance iron, bored to 4.500 inches

OILING: Melling high-volume oil pump, Milodon pan

ROTATING ASSEMBLY: Barton 4.150-inch forged crank and rods; Diamond 10.0:1 forged pistons

CYLINDER HEADS: Mopar Performance aluminum castings with 2.25/1.94-inch valves

CAMSHAFT: custom Barton solid roller (specs classified)

VALVETRAIN: COMP Cams valvesprings, retainers, pushrods, and timing set; Barton shaft-mount rocker arms

INDUCTION: Indy single-plane intake manifold, FAST throttle-body

IGNITION: Mopar Performance distributor, coil, plug wires, and ignition box

ENGINE MANAGEMENT: FAST XFI stand-alone EFI system

FUEL SYSTEM: Aeromotive pump and pressure regulator

EXHAUST: TTI 2.25-inch headers, dual 3-inch Flowmaster mufflers

OUTPUT: 707 hp and 650 lb-ft

BUILT BY: Ray Barton Racing Engines (Robesonia, PA)

DRIVETRAIN

TRANSMISSION: Tremec TR6060 six-speed manual, ACT clutch, Hurst shifter

REAR AXLE: Chrysler 8.75-inch rearend with Moser axles, 4.56:1 gears, and limited-slip differential

CHASSIS

FRONT SUSPENSION: RMS AlterKtion K-member, control arms, sway bar, steering rack, and spindles; Viking coilovers

REAR SUSPENSION: RMS Street-Lynx four-link, Viking coilovers

BRAKES: Wilwood 14-inch discs with six-piston calipers, front; Wilwood 13-inch rotors with four-piston calipers, rear

WHEELS & TIRES

WHEELS: American Muscle Bullitt 18x9, front; 18x10, rear

TIRES: Falken 275/35R18, front; 295/40R18, rear

FUEL SYSTEM: FUEL FILLER GROMMET

Steele Rubber Products now has hard-to-find fuel neck filler grommets for '64-67 Chryslers, Dodges, and Plymouths (PN 70-3622-39, $22.70.) These seals have been molded from high-quality rubber for an accurate fit and long life. Properly made fuel neck grommets secure the filler neck to the body of the vehicle, preventing gasoline leaks. This part fits hardtops, sedans, wagons, and convertibles and is an important part of all restorations for proper performance and safety of your vehicle. All tooling and design is based on original parts uncovered from actual vehicles, and once designed and manufactured, they're tested on a variety of styles and models for the most accurate fit available. And made completely in America too!

SOURCE: STEELE RUBBER PRODUCTS
704-483-9343 • WWW.STEELERUBBER.COM

GEN III HEMI SWAP: DRIVE-BY-WIRE THROTTLE

Lokar's Billet Drive-By-Wire electronic throttle control pedal assembly is pre-programmed at the factory for over 1,400 specific OEM and aftermarket EFI applications, including Gen III Hemi engines. Included with the Lokar Electronic Throttle Control is an application-specific pedal wiring harness that works in conjunction with your OEM or aftermarket EFI wiring harness. The unit's pedal calibration optimizes throttle response to eliminate pedal lag too. The Billet Drive-By-Wire pedal also has built-in hysteresis to provide improved operator control and pedal stability over rough terrain. The new billet design is available in bright or black anodized finish to match your application. The electronic throttle control/harness requires one of Lokar's Drive-By-Wire Pedal sets, which are offered in a variety of styles.

SOURCE: LOKAR
877-469-7440 • WWW.LOKAR.COM

ENGINE RESTO: HEMI ORANGE ENGINE PAINT

Eastwood's 2K Aero Spray High Temp Engine Paint in Chrysler Hemi Orange (PN 14929Z, 11.6 fluid ounces, $29.99) allows you to paint with the durability and precision of a two-component coating without the paint gun! It's formulated with Eastwood's proprietary nano-ceramic technology to provide a long-lasting and durable finish, while keeping its beautiful finish for years. The innovative nozzle and valve technology, combined with its two internal chambers ensure the right ratio is mixed every time. Sprays like a gun with a broader spray pattern than conventional aerosols, and no mess to clean up. Eastwood's 2K Aerospray High-Temp Ceramic Engine Paint is temperature resistant up to 650 degrees F and covers approximately 35 square feet.

SOURCE: EASTWOOD
800-343-9353 • WWW.EASTWOOD.COM

1963 DODGE: NEW LOWER VALENCE

Now front lower valance panels are finally available for '63 Dodge B-Body cars (PN 125-2463, $349.99). Auto Metal Direct (AMD) makes these beautiful new top-quality reproduction panels on their own steel tools so they can maintain strict quality control. Made from heavy gauge steel like original factory parts, these valance panels have all the correct tabs, boltholes, and structural features in place. Finished with durable EPD coating, these panels will look great on your '63 Dodge for a long time to come.

SOURCE: AUTO METAL DIRECT
866-591-8309 • WWW.AUTOMETALDIRECT.COM

BY JOHNNY HUNKINS

34TH MOPAR NATS

Last month, we brought you the action from Mopar Muscle Dyno Showdown sponsored by Classic Industries, which was hosted by the 2014 Mopar Nationals at National Trails Raceway this past August 8-10, 2014. The "Premier Mopar Event," as it has also become known, is in its 34th year, and most of those have been at the same Columbus, Ohio, venue. Some stats: This past year, over 47,000 people, 1,800 vendors, and 2,400 cars made the show. Dates for next year have already been set for August 7-9, 2015, so mark your calendar today—we will be there! In the meantime, here are your car show and burnout contest winners for the 34th Annual Mopar Nats.

RESULTS!

CLASS:	WINNER:	CAR:
BEST OF SHOW – CAR	PAUL PHILLIPS; SALT LAKE CITY, UT	1967 PLYMOUTH HEMI GTX
BEST OF SHOW – TRUCK	RON NARTOWICZ; SPRINGFIELD, OH	1999 DODGE DAKOTA
BEST IN CLASS YOUNG GUNS	KORY PETERSON; EAU CLAIRE, WI	1970 DODGE CHALLENGER
BEST OF HEMI TRIBUTE	ROBERT MONGOLD; CUMBERLAND, MD	1970 PLYMOUTH HEMI CUDA
A-BODY ORIGINAL	RICHARD GOTTLIEB; VERMILLION, OH	1967 DART GTS
A-BODY MODIFIED	TIM LASKER; BRUNSWICK, OH	1968 DART
A-BODY MODIFIED STREET	RON BRUNS; MARIE STEIN, OH	1973 DUSTER
SENIOR	ROBERT CONCA; WHITE PLAINS, NY	1970 CHALLENGER HEMI
B-BODY '62-67 ORIGINAL	JACK BIRCHALL; DUNWOODY, GA	1966 BELVEDERE II
B-BODY '68-70 ORIGINAL	BILL WINKLE	1969 CHARGER 500
B-BODY '71-UP ORIGINAL	MARK MASTERS; MORENCI, MI	1973 ROAD RUNNER
B_BODY '71-UP MODIFIED	CURT STEELMAN; CINCINNATI, OH	1977 CHARGER
B-BODY '71-UP STREET	RICHARD KUZNICK; MIDLAND, MI	1971 ROAD RUNNER
WING CAR	RICHARD BUZBY JR.; LITTLE EGG HARBOR, NJ	1970 SUPERBIRD
C-BODY MODIFIED	JIM BICKEL; BALTIMORE, OH	1959 DESOTO
B-BODY '62-67 MODIFIED	PAUL HAYE; PERRYSBURG, OH	1965 BELVEDERE
B-BODY '68-70 MODIFIED	TOM ANNIS; NORTH LIBERTY, IN	1969 SUPERBEE
B-BODY STREET '62-67	ROGER NOLTE JR.; BEAVER FALLS, PA	1965 CORONET 500
B-BODY STREET '68-UP	ALFIE BRADLEY; PALM COAST, FL	1969 ROAD RUNNER
E-BODY ORIGINAL	ROMAN SOBILO; NEW BALTIMORE, MI	1970 CHALLENGER CONV.
T/A-AAR ORIGINAL	DAVID CARTE; EDINBURG, VA	1970 CHALLENGER T/A
E-BODY MODIFIED	DAVID ELLISON; HARROGATE, TN	1971 HEMI CUDA
E-BODY STREET	PETER CELINI; LANCASTER, PA	1971 CHALLENGER
MODERN MUSCLE ORIGINAL	BARNEY SPARROW; HILLIARD, OH	2012 SUPERBEE
MODERN MUSCLE MODIFIED	STEVEN GAWADZYN; AMHERSTBURG, ONT, CAN	2010 CHALLENGER
MODERN MUSCLE STREET	DAVE KOHLER; MARYSVILLE, OH	2012 CHALLENGER
TRUCK/VAN ORIGINAL	MICHAEL MASTERS; FLEMINGSBURG, KY	1977 WARLOCK
TRUCK/VAN MODIFIED	RON NARTOWICZ; SPRINGFIELD, OH	1999 DAKOTA
CLONE	DENNY GUEST; MATTESON, IL	1967 CORONET R/T
PRO STREET	SHERWIN KIESSHAUER; FORT LAUDERDALE, FL	1972 DEMON
STREET ROD	RICHARD WARNER; ARLINGTON, TX	1926 DODGE PU
FRIDAY BURN-OUT CONTEST	BRAD SCHARDIN; MARION, SD	1978 MAGNUM SRT
SATURDAY BURN-OUT CONTEST	JACK STICKLE	1973 CUDA

CHASSIS FOR MOPARS —TAKE 2

In November's story on Mopar suspensions, we inadvertently showed a photo of an Art Morrison Engineering Max G chassis in our write-up of Roadster Shop's RS Fast Track chassis for '70-74 E-Body. The Max G chassis we showed a picture of is designed for unibody-style muscle cars, where the stock floorboard is removed and the body dropped onto the chassis. It's exactly what AME recommends for major Mopar projects where handling is paramount. The Max G can be built to order for any unibody Mopar, and is equipped with a C6 Corvette front suspension and a three-link setup with Watt's linkage in the rear. Starting price for the Max G (as shown) is $13,292. (AME can tell you more by calling 253-922-7188, or clicking ArtMorrison.com.)

To clarify things here, we're also showing the *correct* photo of Roadster Shop's RS Fast Track chassis. As mentioned in our November story, the RS Fast Track has a standard triangulated four-bar rear suspension design with Afco billet coilovers (IRS optional). In the front, the Fast Track gets C6 Corvette spindles and Z06 hubs that allow for great suspension geometry and a wide selection of brakes (13- or 14-inch Wilwood discs are standard). Since the RS Fast Track chassis is a permanent weld-in, it also adds a great deal of rigidity over a stock E-Body. The RS Fast Track chassis starts at $15,995. For additional details, contact the Roadster Shop at 847-949-7637, or log on to RoadsterShop.com.

Art Morrison Enterprises' (AME) Max G chassis can be ordered for any Mopar unibody chassis, and essentially makes your car into a body-on-(really good)-frame setup.

Roadster Shop's RS Fast Track chassis for '70-74 E-Body—the real photo. Although similar looking to the AME Max G, it uses a triangulated four-bar in the rear, or optional IRS (shown).


Mpar High Performance
High Performance Balanced, Blueprinted and Dyno Tested "Complete" Pump Gas Engines!!
318/300 Hp - L# $3896
318/325 Hp - C $3896
360/350 Hp - L# $3996
360/375 Hp - C $3996
360/400 Hp - C $4996 ✓
383/375 Hp - L# $4996
383/400 Hp - C $4996
383/425 Hp - C $5996 ✓
408/408 Hp - L# $5996 ✓
408/450 Hp - C $5996 ✓
408/500 Hp - R $6496 ✓
440/415 Hp - L# $4996
440/440 Hp - C $5296
440/475 Hp - C $5996 ✓
440/500 Hp - R $6296 ✓
522/500 Hp - L# $6996 ✓
522/525 Hp - C $6996 ✓
522/550 Hp - R $7296 ✓
CME CRATE ENGINES
Pump Gas CRATE Engines from Turnkey to Short Blocks. Picture shown with additional options.
Factory Direct Pricing!
All Prices Subject to Change!
CME Performance
Ford, GM and Others Available!
Call:
1-888-575-1995 Toll Free
Performance Upgrade Long Blocks*
318/300 Hp - L $2296
318/325 Hp - C $2296
360/350 Hp - L $2296
360/375 HP - C $2296
383/375 Hp - L $2496
440/415 Hp - L $2496
440/440 Hp - C $2496
Replacement OEM Stock Long Blocks*
2.7 Liter V6 98-04 $2296
3.9 Liter V6 92-03 $1296
4.7 Liter V8 99-06 $2396
5.2 Liter V8 67-89 $1296
5.2 Liter V8 92-03 $1396
5.9 Liter V8 93-03 $1496
Marine Long Blocks*
318 V8 75-89 Std $1696
318 V8 74-89 Rev $1796
318 V8 74-89 Perf $2296
CME Performance TM
L - Lopey Idle C - Choppy Idle ✓ - Aluminum Heads
R - Rough Idle * - Exchange Price # - Daily Driver
CAROLINA MACHINE ENGINES
email us at: sales@cmengines.com
BBB ACCREDITED BUSINESS
Much More Info & Many More Engines Available At:
WWW.CMENGINES.COM
Over 50,000 Performance, Marine & OEM Engines since 1984! • Two Time NHRA Racing World Champions!
Mpar High Performance 2-3-2014


AMERICAN POWERTRAIN TM
MORE GEARS. MORE FUN.
E-BODY 5 - SPEED TRANS KIT
Tremec TKO A, B & E Body 5 Speed Kits
• 600 ft-lb rated, cuts your highway rpms by up to 36%, original 4-speed shift position, no mods to tunnel or console, 950 ft-lb Xtreme upgrade available
• Short throw White Lightning bias adjustable billet shifter – Fits your original shifter position and console, provides great feedback
• 3.0" Seamless DOM Driveshaft – race balanced with cryo hardened yoke and solid u-joints
• Complete installation kit with poly mount, Weatherseal reverse light wiring harness, pilot bearing, shift lever, and hardware pack
Optional Hydramax hydraulic clutch conversion for smooth and accurate shifts
Hundreds of Science Friction Clutch and Flywheel Options including our patent pending Wave-LAFT clutch for track and street combo action
NEW & IMPROVED LOWER PRICED A-BODY KIT COMING SOON
sales@americanpowertrain.com
www.americanpowertrain.com
931-646-4836

HELLCAT ALLOCATION EXPLAINED: HOW MANY & WHERE?

How many Hellcats will be built? We still don't know, but at least we know where you'll most likely be able to find one at a good price: a high-volume Dodge dealer.

Supply and demand is the rule by which free market systems operate, but when it comes to highly desirable items, things can get out of hand. We've seen it plenty of times on special edition or limited production vehicles: huge dealer markups. The gouging can go into the tens of thousands and move the cars up into the territory of only the super wealthy. Dodge has a plan in place to preempt that, and possibly get more Hellcats in the hands of enthusiasts.

Initial Hellcat allocation will be based on the number of Dodge vehicles that a dealer has sold in the previous 180 days. A second allotment will be based on the last 90 days of sales and 30-day turnover. "You sell a lot of Darts for me, Journeys for me, Durangos for me, I'm going to give you the rights to this one too, because this is a halo of the brand," Dodge President and CEO Tim Kuniskis told *Automotive News*.

Here's where it gets interesting. After that initial allocation, Dodge plans to count the days that a Hellcat sits in the showroom. That's an important statistic because dealers that markup the price significantly will likely see the cars staying on the lot for a longer time. That will affect the future number and availability of Hellcats for that dealer.

"If you want to market-adjust the car, that's your right. But if your days on lot goes above what the other guys that are selling them at MSRP is, they will end up earning the allocation because their days on lot will be lower. They're turning the inventory," Kuniskis said. "Some dealers are going to have heartburn with that." He continued, "I want this car out in the marketplace so that somebody is sharing it with 50 of their friends and elevating the brand. That's what I want, not sitting in your showroom with a rope around it. I want people driving these cars, talking about them, revving the engine, and having everybody go, 'I want one of those.' That's why you build a halo car."

Dodge CEO Tim Kuniskis to Dodge dealers: "I want this car out in the marketplace … not sitting in your showroom with a rope around it."

"Initial Hellcat allocation will be based on the number of Dodge vehicles that a dealer has sold in the previous 180 days."

We completely agree with this plan, and wonder why nobody thought of it before. Bottom line: If you want a Hellcat, go to a high-volume dealer. Still, we do not have a clear picture of how many Hellcats will be produced, and dealers will always be greedy. With a Corporate Average Fuel Economy number near 36 mpg looming over every manufacturer's head next year, the quantity of Hellcats built will have to be pretty limited, and that's not a number anybody at Chrysler is willing to talk about freely. —*Christopher Campbell*

VIPER PRICE CUT ANNOUNCED

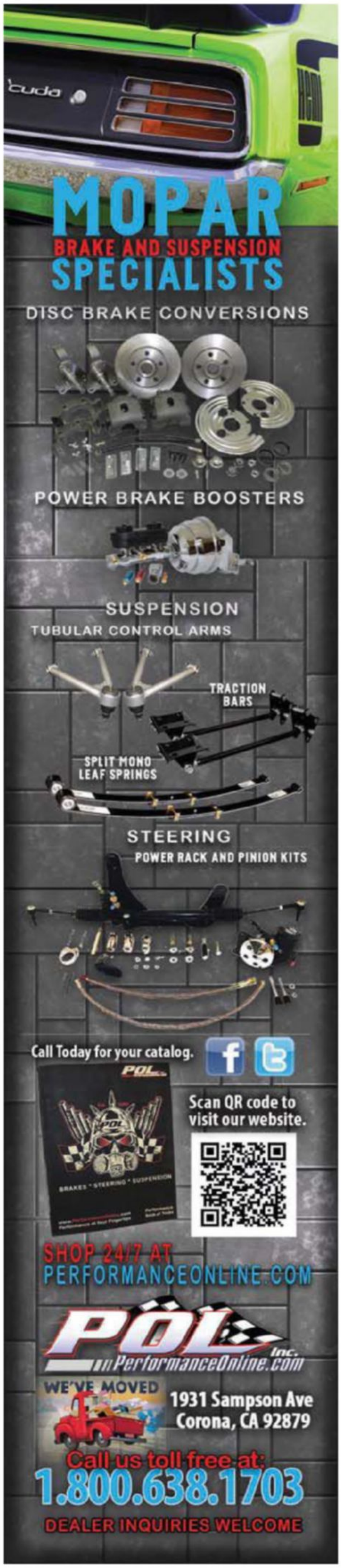
In an effort to be more competitive in the marketplace with Chevy's new Z06, Dodge has decided to cut the MSRP of the '15 Viper by $15,000 to start at $84,995. For 2015, the naturally aspirated 8.4L V-10 gets more horsepower (645—up by 5), and as the lighter car, should just have the supercharged 650hp LT4-powered Z06 covered in a straight line and around the twisties. Dealers with 2014 model year inventory have been instructed to cut the MSRP by the same $15,000, effective immediately. Moreover, owners of Gen 5 Vipers (2013 to 2015) will receive a certificate worth $15,000 to be redeemed toward the purchase of a new Dodge Viper (in addition to the $15,000 price reduction). Like we always say, you can't have too many Vipers in your driveway!

CALLING SOCAL LATE-MODEL HEMIS!

If you live in Southern California and you own a completely stock, late-model Hemi-equipped vehicle, we'd love to hear from you. We are looking for a few lucky readers who would like to use their 5.7L, 6.1L, or 6.4L Hemi-powered Charger, Magnum, Challenger, or 300C to test some free performance parts. Products may include exhausts, headers, cold-air boxes, tuners, superchargers, water/meth injection, nitrous kits, or suspensions. We'll be building a database of Hemi owners to pull from who don't mind some freebies and some magazine coverage thrown their way. Shops in SoCal specializing in Mopars are also welcome to participate as installers, dyno centers, and/or car donors. Disclaimer: This involves some wrenching and experimentation, so owners can't be squeamish about warranty issues, hard testing, or breakage. Flexible days off when given a one-week advance notice is a super big plus. Moreover, some products may be legal for off-road use only. If you're interested, drop editor Johnny Hunkins an email at JHunkins@EnthusiastNetwork.com with the subject line "Late-Model Hemi Test Car." Don't forget your full name, hometown, model and year of car, color, and best contact phone number. A single photo of your car would be great. We can't guarantee you'll be chosen, but if you don't go to the ballpark, you'll never get a chance at bat!


Don't SLAM that Door!!
There's no need to slam when you use
METRO Sponge SUPERsoft
Feel The Difference
weatherstripping products
There is a distinct difference in weatherstripping and rubber products for your car. Learn the details at:
metrommp.com
METRO Moulded Parts Inc.
Metro Moulded Parts, Inc.
11610 Jay Street, Minneapolis, MN 55448 - USA
toll-free fax: 1-877-399-2562 phone: 763-757-0310
toll free: 1-866-521-0310
metrommp.com


COOL CRAFT
HIGH PERFORMANCE RADIATORS
(888) 587-7234
RADIATORS THAT LOOK & FIT RIGHT!
MOPAR RADIATORS
1962 - 1976 SB & BB Correct Fit Radiators!
22" & 26" available with application specific tanks and brackets, even in aluminum.
Several Core Designs To Cool Any Engine!
ORDER ONLINE!
ELECTRIC FAN SHROUDS
Custom Shrouds - Utilize Your Entire Core!
Starting At $95
All we need is your core size. With or without electric fans.
WWW.COOLCRAFT.COM
sales@coolcraft.com
(888) 587-7234


MOPAR
BRAKE AND SUSPENSION
SPECIALISTS
DISC BRAKE CONVERSIONS
POWER BRAKE BOOSTERS
SUSPENSION
TUBULAR CONTROL ARMS
TRACTION BARS
SPLIT MONO LEAF SPRINGS
STEERING
POWER RACK AND PINION KITS
Call Today for your catalog.
Scan QR code to visit our website.
SHOP 24/7 AT PERFORMANCEONLINE.COM
POL Inc.
PerformanceOnline.com
WE'VE MOVED
1931 Sampson Ave
Corona, CA 92879
Call us toll free at:
1.800.638.1703
DEALER INQUIRIES WELCOME

HEADER HUNTING

I'm a long-time reader, and I finally need some help. Crazy as it is, I'm dropping an Edelbrock supercharged 6.1 into a '66 Barracuda. Thanks to an AlterKtion front end, it's in and wired. The problem is the exhaust. I haven't been able to find anyone who makes headers for this swap (there's no room). I'm at a standstill until I solve this. Do you have any alternative suggestions on manifolds and what may fit? Any help would be greatly appreciated. I've been a Mopar fan for over 50 years, and this is my most challenging project yet!

RON

Ron, I'm afraid you are on your own on this one. The early A-Body is limited in header availability even with a small-block, and the Gen III Hemi makes it even tougher. As you said, "There is no room." The coilover suspension does create extra space, and that's a plus in this situation. You are going to be looking at having a custom header made. While this isn't a cheap option in most cases, it is fairly common in a custom application like yours. If you wanted to drop down to manifolds, these are more compact than headers and represent a cheaper option, but you are likely to require modifications to the inner fender aprons to get them to fit. With a supercharged Hemi, headers really make more sense, and custom headers are going to be your only option.

TRIPLE DARTS

Hey there, got a big question: I have purchased three Darts recently with VINs: LL23B9B347688, LH23B9B427504, and LH23B8Fxxxxxx. My question is this, are these Swingers, GTs, or Customs? I can decode everything except what the "high" and "low" (second letter in VIN) actually means for these years. Any help would mean a lot. I don't want to put Swinger decals on a GT, or vice versa.

Thanks,
BJORN DAVSSON

Bjorn, all three of your cars are six-cylinders, so that rules out the Swinger or GTS trim level, which would have been coded M and S respectively. Swingers were only available with the 340, while the GTS came with 340, 383, or even 440 engines in 1969. A "P" code designates the Dart GT. On your cars, the "LL" in 1969 was a base Dart. "LH" was the Dart 270 in 1968, and became the Dart Custom for 1969.

STRIKE OUT

I have a '68 Dodge Dart that is in very nice original condition, and even still has the original bronze factory paint. The problem I have is the driver-side doorjamb. This is where the door latches to keep the doors closed. At the area where the pin screws into the doorjamb, the sheetmetal is cracked all around. I can tell someone had tried welding it in the past, but the welds are now broken, and my door does not shut correctly. I'm looking for a way to repair this so that I can shut my door. I think it is pretty unsafe the way it is so I haven't been driving the Dart until I get this fixed. Any advice is appreciated.

MARK REESE

Mark, this was a notorious weak spot on these A-Body cars, so finding this area damaged or with improvised repairs is not unusual. When I purchased my '68 Barracuda, the door was held shut by a dog leash going from the driver seat to the door lock button.

The striker pin screws into a captive plate on the back side of the panel, which spreads the load, but just into the surrounding sheetmetal. On other models, Chrysler added additional reinforcement to the striker area. I have seen well-done simple weld repairs that have held up nicely over the years. Here, the adjustment of the latch is just as important to longevity as the quality of the weld work. If the latch is beating against the striker because of a worn or misadjusted latch or an improperly aligned door, all bets are off on any weld job holding for long. I have also welded the external sheetmetal while adding additional support similar to that found on an E-Body for a stronger repair. This requires getting into the inner quarter-panel to add a fabricated bracing plate.

IRON MAN

I have an original '68 Charger R/T with the four-barrel 440 engine. I have had this car since 1982, and back in those days the stock 440 was a beast on the streets. Compared to the cars back then, a stone-stock 440 was a real animal. I still drive the Charger regularly, but times have changed. The car gets quite a bit of appreciation as a classic, but power wise I feel like it just isn't enough anymore. With the power of modern muscle cars, the old 375hp 440 just isn't enough to keep up. Heck, even new trucks come with as much power as those old 440s, and we're not talking gross 1968 horsepower here.

Now for my point and question. I liked the fact that my Charger was king of the road back decades ago, with enough power to handle practically anything on the streets. I know the 440 can be built up to practically any level of performance, and I do think I need a good 550 hp out of it. The rub here is I want to keep it as stock as possible. I want all of the original iron on the motor, from the factory exhaust manifolds and cast-iron intake, to the original 906 heads. I want a cam that idles not much rougher than the stock Magnum cam, and will still idle when I turn on the factory air conditioning. So what do I do to the motor to get all that?

DAVE WOODEL

Dave, you are asking a lot looking for 550 hp while keeping all of that factory iron. The easy answer here is nitrous, but I'm assuming you want to keep it all motor. Frankly, I don't think you can get there. There is going to be a great deal of custom work in trying to gain significant power with the OEM parts. Let's look at the parts and the associated limitations and possible modifications.

The heads can be pro ported for respectable flow, with some of the best topping out at around the 300-cfm level. That is enough flow to make horsepower and to hit your numbers. The port work to get there is extensive. The intake manifold is going to be a killer, as the factory iron unit was nothing special. In fact, the four-barrel performance versions of the 440 used the same intake manifold as

the standard passenger car 440. Porting of the stock manifold is going to be very difficult. An aftermarket two-plane intake like the old Edelbrock CH4B might be a good compromise, since it will really help and looks similar to the factory manifold. The exhaust manifolds will hold your combination back compared to the easy power available with headers.

So what else is there to work with? Adding a stroker crank will build up the torque curve, and add some peak power even with an airflow-restricted combination like this. The pistons and ring package is an often overlooked area. A good modern forged piston with a low-drag 1.2 or 1.5mm ring package is going to add power compared to those old 5/64-inch rings. Camshaft selection is going to be important. Since you want to maintain a relatively docile idle, you are going to be limited in duration. Here, a retrofit hydraulic roller will be a plus, since the lift can be substantially boosted while keeping the overall duration short. I would build in a little extra compression ratio, and go with a relatively wide lobe separation of 112 degrees. Depending upon how high tech you want to go, you can add performance coatings in the cylinder heads and on the pistons to better manage internal heat and reduce the tendency to detonate.

I don't know how far you are willing to go or whether you will meet the power level you are after, but you can certainly bump that 440 up significantly while keeping it stock appearing.

FRIED WIRING

I have a '72 Charger SE with all the options including power windows and A/C. I had a major problem that nearly cost me my car. I was cruising around town when I started to smell something electrical. All of a sudden the inside of the car filled with smoke and I thought it was on fire. I pulled over and opened the hood and the engine compartment harness was frying. Luckily, my battery post was not too tight and I was able to yank off the negative terminal.

I got the car towed home and looked over the damage. The wiring harness to the engine, the bulkhead connector, the ammeter in the dash, and the underdash wiring are completely cooked. It looks like a dead short and that got the wires to melt and go into meltdown. I noticed there was no fusible link in the main feed, it was just replaced with a 12-gauge wire from the relay. Fixing this is going to be a bear of a job, but at least I still have my Charger. I have two questions: What do you think caused the problem, and what can make the electrical system safer?

MATT JORDAN

Matt, there are several factors that could have come into play here, from an actual dead short initiating the chain reaction, to a failure due to overheating of the wiring. The OEM wiring was marginal, especially with the higher current wiring going through the bulkhead from the alternator and battery. This is a trouble spot, as is the circuit going through the ammeter. These points will commonly overheat and can cause a short or ground circuit. The situation

is worse with heavy electrical loads and higher amperage alternators. Take out the fusible link, and you really have a disaster waiting to happen.

On my regularly street-driven Mopars, I bypass the ammeter and use a voltmeter instead. This eliminates all of the current having to run through the gauge. I also bypass the charging wire to the battery terminal of the starter relay. I then use a single rerouted feed wire from the battery terminal to the old ammeter wire under the dash, adding a resettable circuit breaker at the starter rely connection in place of the fusible link.

TIRE TROUBLE BREWING

I recently brought home a '73 Road Runner, which for me was the find of a lifetime. To say the car is clean is an understatement—the car is perfect. The previous owner backed it into his garage in 1982, and there it sat under a cover until now. The car was put away for storage correctly, and with replacement of the fluids, battery, and repairing a caliper, I have the car back on the road in style. One thing that has been brought up as a concern is the tires. The car has the old-style BFGoodrich radial T/A tires from the early '80s, and believe me, they look good. The tread is nearly all there, like they have very little wear.

A buddy of mine insists that these tire are too old, and could blow. Another guy I know that is into old cars says the tires are fine, and that I shouldn't worry about nothing. I would like to avoid the price of new tires, since the car was not cheap, and I am hesitant to add on more expense. I do like to take this car on a high-speed blast every once in a while, so should I be worried?

GREG FIELDS

Greg, I know it seems like an unnecessary expense given that your tires have plenty of meat in the tread, but consider the downside if a tire fails. Aside from the potential for an accident, a blown tire can demolish the sheetmetal of your Road Runner like you wouldn't believe. If that unfortunate scenario should play out, you'll look back and really regret not getting new rubber. I have seen plenty of tires that looked good fail by throwing the tread, taking out fenders and quarters in the process. Yes, tires do deteriorate from age, and after 25 odd years, the smart bet is to replace that old rubber. Coker Tire actually reproduces brand-new versions of the early BFG T/A, so if you're looking for the same vibe, you won't have to give up anything.

GOT A TECHNICAL QUESTION YOU NEED HELP WITH?
Well, we're the guys to ask. Send your technical questions to us via our *Mopar Muscle* email, jhunkins@enthusiastnetwork.com. If you're old school, snail mail your info to Mopar Muscle Magazine C/O Performance Clinic, 1733 Alton Pkwy. Suite 100, Irvine, CA 92606.


MORE FUN.
LESS DRAMA.
BOLT ON SUSPENSION FOR
1963 - 1976 MOPARS
A/B/E BODY APPLICATIONS
NEW
HOTCHKIS
SPORT SUSPENSION
ADJUSTABLE
MONOTUBE SHOCKS
WWW.HOTCHKIS.NET
877-466-7655
HOTCHKIS1
@HOTCHKIS


TONY'S Mopar PARTS
302-398-0821
NEW B-BODY CONSOLES
NEW E-BODY CONSOLES
Specializing in Muscle Car Era
Plymouth / Dodge Cars & Parts
A•B•E BODY
NOS / USED:
4 Speed Components
Grilles / Trim / Seats
Fenders / Hoods
and much more !
tonysparts.com
Harrington, DE
NUMBERS
MATCHING:
Carbs / Rear Ends
Distributors
Manifolds
Radiators


PHOENIX
GRAPHIX
PGI
R/T
"Any Decal, Any Car, Any Year!"
World's largest Manufacturer of
Licensed Plymouth/Dodge Restoration Decals.
SUPER BEE
DEMON
STRIPE KIT DECALS
AUTHENTIC RESTORATION PRODUCT
800.941.4550
www.PhoenixGraphix.com
ESTABLISHED 1985
SATISFACTION GUARANTEED
OEM LICENSED MANUFACTURER
UNBEATABLE PRICES


Inline Tube.com
The Professional Restorers #1 Choice
CNC Preformed
Brake & Fuel Lines
Straight Length
Tube Benders
Flaring Tools
Spring Wrap
Tube Nuts
Fittings
Tubing
& more
Many
Exclusive
New Products!
Fuel Injection
Lines
Brake & Fuel Lines
Highest Quality / Best Price / Largest Selection
Premium Stainless
or OEM Tin Steel
Parking Brake Cables
SS Braided or
OEM Rubber
Brake Hoses
Brass Rear
Tee's
Cable Hardware
Clips
Orders Shipped
in 24 hours
Proportioning Valves
Disc Brake Kits
If you expect the
best quality and the best price -
Your classic car deserves a set of Inline tubes
Online Catalog & Ordering @
Inline Tube.com
Brake Plumbing Products
15066 Technology Dr. Shelby Twp. Michigan 48315
Order (800)385-9452 Ph (586)532-1338

BY CHRISTOPHER CAMPBELL

1962 VALIANT/SIGNET 200
MIKE BUCKLER
COLORADO SPRINGS, CO

Mike Buckler's original build plan was to find a "not-so-popular" car, so as to own a unique custom. In the late '80s he began looking for a lightweight car with six-cylinder power that he could inject a V-8 into. The goal was a two-door hardtop of some vintage that would qualify as the only one around like it.

Early Plymouth Valiants, with their quirky Virgil Exner styling, certainly fit the bill. Much of the public found their styling a bit too radical, but to Buckler the lines were appealing and ideal for his vision. The problem was tracking down the elusive Signet 200 two-door. After a five-year search, he happened across this particular '62 sitting on a residential street. The original owner was home, and he was willing to part with it for $650 that day.

The next 13 years found the Valiant unchanged and waiting for work to begin. Hard-to-find trim pieces, parts, and gaskets were stockpiled as Buckler prepared for the big transformation. The real work finally began on June 21, 2004. His good friend, and Mopar guy, Ralph Bagdasarian, shared years of car-building experience (including free parts and labor) to lead and mentor Buckler through what would prove to be a rather challenging build. All the work happened in Bagdasarian's barn, with the exception of bodywork, paint, and interior. The 380hp 360 Magnum and 727 swap, as well as full suspension and brake upgrades, were complete by October 2005; paint and interior were wrapped up in 2010, with many thanks to Buckler's wife, Diana, for pitching in to fund it.

Today, the Valiant is a regular at local shows and hamburger joint cruises within 50 miles or so. It's even collected a few awards, including the Gold Mine Award at Cruise Above The Clouds in Woodland Park, Colorado, which was chosen by Dennis Gage of *My Classic Car*.

1970 PLYMOUTH BARRACUDA
BOB WAGENHALS
CONIFER, CO

When Bob Wagenhals first saw this Tor Red '70 Barracuda sitting in a driveway in rural Utah back in 2005, it was uncovered and looked as though it had been parked for a few years. A few months later, Wagenhals passed by again, but this time he left a business card under the windshield wiper. It was a long shot, but it paid off two years later when the owner called and asked if Wagenhals was still interested. One day and 350 miles later, Wagenhals was putting cash in his hand and loading the one-owner Barracuda onto a trailer.

As he was loading it, Wagenhals learned that the Hamtramck-built 318-powered, column-shift, bench-seat Barracuda had been driven daily until about 2002. Since the specs weren't impressive, Wagenhals decided to do a full rotisserie restoration, but convert it to a 440 Six-Pack, Shaker hood 'Cuda with 727 trans, 8.75 Sure-Grip rearend, and bucket seat and console interior. Essentially the 'Cuda he always wanted.

After stripping the car in his garage, the bodywork and paint was done by Nice Rides Restoration in LaSalle, Colorado. Wagenhals tells us the crew are real professionals who did excellent work, and even taught him quite a bit when he visited. While the body was in process, Wagenhals built a '69-coded 440 Six-Pack with stock heads and rods and a .474-lift, 234-degree-duration-at-.050 cam. The 489-case 8.75 rear received a slight narrowing so that Wagenhals could fit 275/60R15 BFGoodrich Radial T/As on the 15x8 Rallyes in the rear without any body interference. Other than that, everything is stock, right down to the chrome push-button AM radio. "It's just for looks," Wagenhals said. "I can't hear it over the exhaust anyway."

HOW TO BE IN PENTASTARS Send images of your ride, along with all the information about your ride, and we'll make you a star. Remember to include *all* your information, even where you're from. Send your digital images (at least 3,000x2,000 pixels) and information to jhunkins@enthusiastnetwork.com or Mopar Muscle Magazine C/O Pentastars, 1733 Alton Parkway Suite 100, Irvine, CA 92606. Send us a good quality front ¾ shot (think feature shot), and an interior and engine bay shot.

MOPAR MUSCLE (ISSN 1056-2966) **February 2015; Volume 28, Number 2.** Published monthly by Source Interlink Media, LLC, 261 Madison Ave., 6th Floor, New York, NY 10016-2303. Copyright 2014 by Source Interlink Magazines, LLC. All rights reserved. Periodicals postage paid at New York, NY and at additional mailing offices. SUBSCRIPTIONS: U.S. and U.S. Possessions $29.97 for 12 issues. Canadian orders add $12.00 per year and international orders add $24.00 per year (for surface mail postage). Payment in advance, U.S. funds only. **POSTMASTER:** Send all UAA to CFS. (See DMM 707.4.12.5); NON-POSTAL AND MILITARY FACILITIES: Send address corrections to Mopar Muscle, P.O. Box 420235, Palm Coast, FL 32142-0235. Contributions should be sent to Mopar Muscle Magazine, 1733 Alton Parkway Suite 100, Irvine, CA 92606. Manuscripts must meet the criteria of the Writer's Guidelines. For a copy, send an SASE to Mopar Muscle Magazine,1733 Alton Parkway Suite 100, Irvine, CA 92606.

JUST LIKE SANTA...WE SHIP FOR FREE*!
*TO 48 STATES
GM - MOPAR - FORD - TRUCK PARTS
PLYMOUTH
POLYGRAPHITE PERFORMANCE
STANDARD & SUPER FRONT END KITS
DISC BRAKE CONVERSIONS
SAVE BIG BUY KITS!
Featuring OEM Style Booster & Master Cylinders
NEW
DOUBLE ADJUSTABLE SHOCKS
VIKING PERFORMANCE
• 19 positions of compression and rebound for a total of 361 different valving combinations
• Lightweight aluminum construction
• 5/8" centerless ground, hard chrome plated piston rods
• Precision machined piston with PTFE/bronze piston wrap
ADJUSTABLE TUBULAR UPPER CONTROL ARMS
• Tubular construction for weight savings and strength
• Eliminate poor alignment angle
• Ideal for pro touring, street or drag builds
• Chrome Moly rods with Teflon inserts for frictionless movement
NEW FOR MOPAR
STEERING COLUMNS
• 8-Position Tilt
• 4-Way Flashers
• Knob & Levers
• Self Canceling Turn Signals
• Collapsible Steering Column (certain models)
ididit
CALIPER BACKING PLATES
NEW FOR GM
• Fit and function like the originals
• Protected with anti-rust coating
• Saves time & money
ALSO AVAILABLE: STRUT RODS, ADJUSTING SLEEVES, BUSHING SETS, SWAY BARS, TORSION BARS, TRANSMISSION & MOTOR MOUNTS, FUEL TANKS, RADIATORS, WINDSHIELDS, KBS SOLUTIONS, POWER STEERING BOX, DROP SPINDLES, PIVOT SHAFTS, AND MUCH MORE!
PST
PERFORMANCE SUSPENSION TECHNOLOGY
SCAN & ORDER NOW
Call Today for PST's New FREE Catalog!
877-224-1710
LIMITED LIFETIME WARRANTY
ORDER TOLL FREE OR ONLINE
877-224-1710
www.p-s-t.com
COD
VISA
Generic Photos - actual part may vary.
S657-ML2T